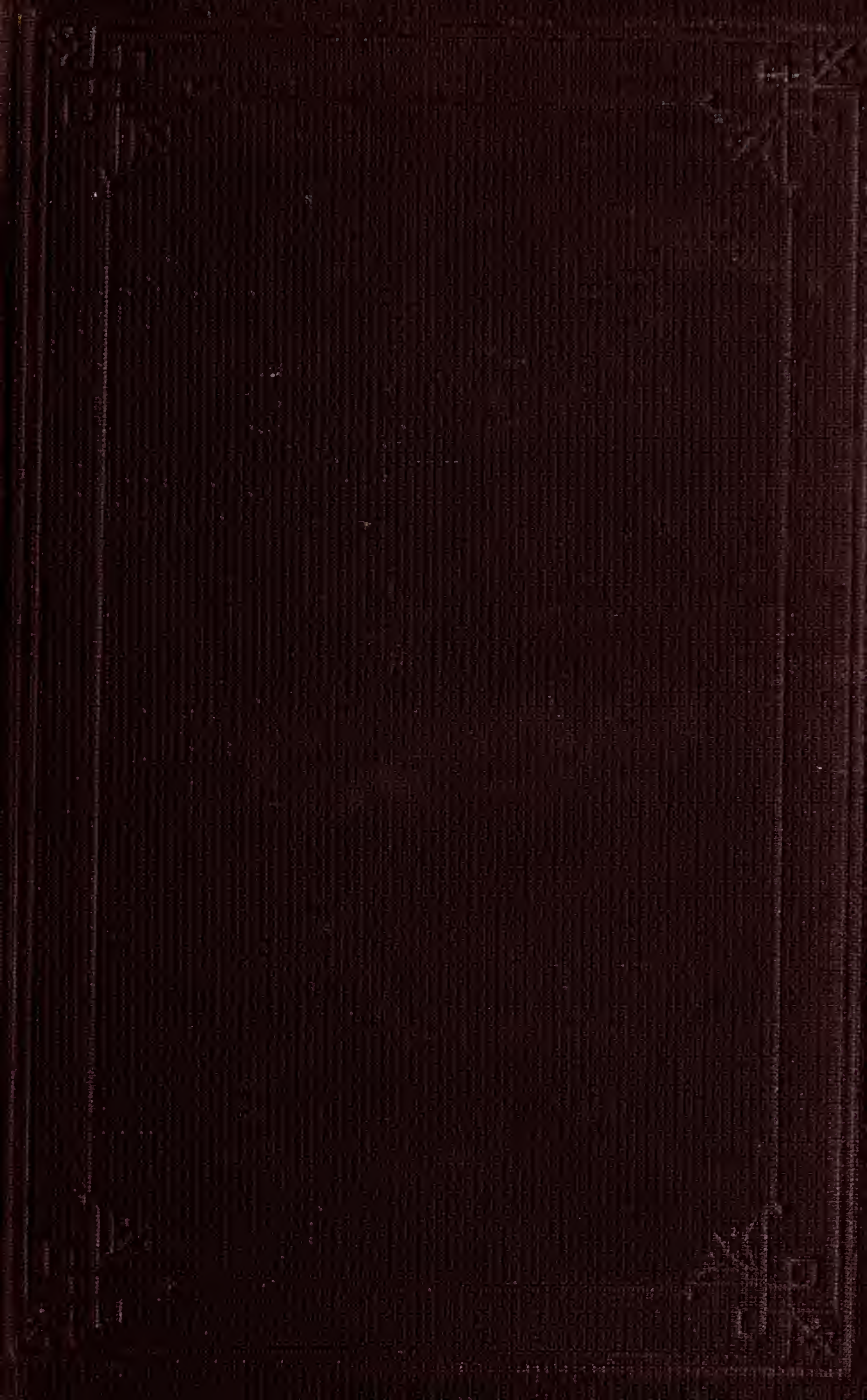

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The
Practical Medicine Series

Comprising Eight Volumes on the Year's Progress in
Medicine and Surgery

Under the General Editorial Charge of

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Volume VI

Pharmacology and Therapeutics

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INTRODUCTION.

"The war is over, but its effects are not." This is true of its baneful as well as of its beneficial effects. We are now reaping the harvest of a tremendous volume of experience in certain phases of medicine and surgery that civilian practice could never have furnished. Among these is blood-transfusion, which not being medical and yet not strictly surgical either (especially in its simplified forms) is a topic likely to fall into unmerited neglect, unless its discussion is taken up by the Department of General Therapeutics. Likewise, enormous experience with tetanus antitoxin, quinine in malaria, with the treatment of venereal disease, with antiseptics and disinfectants is reflected in the current reports on these topics.

Among the most notable advances of the year may be mentioned the demonstration that histamine is probably the active principle of hypophysis, and that benzyl benzoate is likely to be a useful antispasmodic. Our knowledge of the vitamines is becoming more definite in our understanding and management of certain nutritional disorders, and is likely to lead to as profound a revolution as has been wrought by our knowledge of the hormones.

The "Practical Medicine Series" seems to be a good medium for the introduction of useful new terms. Hence, the word "bacteriostatic" has been introduced instead of the ambiguous term "antiseptic" in its limited sense. That "Pyretotherapy" has practical value can no longer be doubted. Almroth E. Wright—he who introduced the concept of "opsonins" into medical literature—finds it necessary to coin a number of new terms, "phylaxis," "kataphylaxis," "epiphylaxis," "ecphylactic," for the discussion of the practical problems of immunology; and, while one may at first feel repelled by this array of new words, the ideas they express so briefly are of such practical importance that it would be well to give these terms currency. It may be noted parenthetically that, with the introduction of these terms, A. E. Wright, the high-priest of vaccine therapy, admits and emphasizes its limitations.

The fact that, before the next publication of this volume of the "Practical Medicine Series," the U. S. Pharmacopoeial Convention will meet in Washington, D. C. (May, 1920), and the importance of obtaining the greatest possible coöperation at this occasion from the rank and file of medical practitioners, make it appear desirable to call attention to the necessity of formulating the results of experience in such a manner that they exert due influence. By devoting some time to this topic in medical society meetings and by forwarding suggestions to delegates to the Convention, every physician, no matter where he be located, may do his bit in improving our national standard on medicines.

Bernard Fantus.

PHARMACOLOGY AND THERAPEUTICS.

GENERAL CONSIDERATIONS.

New Names for Syntheties. It was pointed out in this volume last year[1] that the Federal Trade Commission adopted the names *arsphenamin* and *neo-arsphenamin* for the drugs first introduced under the proprietary names of "salvarsan" and "neosalvarsan," respectively; the terms *barbital* and *barbital sodium* for the substances first introduced as "veronal" and "veronal sodium," and the word *procain* as the name for the compound first marketed as "novocain."

The *Journal of the American Medical Association*[2] calls attention to the fact that the Chemical Foundation, Inc., which has purchased some 4,500 German-owned patents, many of them for synthetic drugs, proposes to continue the policy of the Federal Trade Commission by requiring that those who receive licenses for the use of patents for synthetic drugs must use a common designation for each drug selected by the foundation. *"Cinchophen"* has been selected as the designation for the substance introduced as "atophan," described in the U. S. Pharmacopeia under "phenylcinchoninic acid."

The Council on Pharmacy and Chemistry of the American Medical Association has recognized the contracted term "cinchophen" as a name for this drug; and it is well for physicians to adopt this simplification.

Report of the Drug Market for 1918. H. B. French[3]

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(1) Practical Medicine Series, Vol. VI, 1918, pp. 12-14.
(2) Aug. 9, 1919.
(3) Jour. Amer. Pharm. Ass'n., August, 1919.

finds that American crude drugs are advancing in price, owing largely to the lack of labor and to the high cost of labor. There are, of course, some notable exceptions. Opium was kept in storage in Asia Minor for several years and a very large stock has been accumulated. As soon as possible, holders rushed as much of their product as they could ship to the El Dorado of America, so that they might realize something to meet their present necessities; consequently, there has been a very important reduction in the price of opium, although the manufacturers of the derivatives of opium have steadfastly maintained the prices of those products. Glycerine has fallen to about one-third of its highest price. Castor oil is another article that has shown a decisive decline. French ventures the general prediction that during the balance of 1919 the tendency of chemicals will be to lower prices and of crude drugs to remain as at present or to advance.

Some of the comparative prices given in the report might be of interest. It is to be noted that these prices are for large quantities.

Name of drug—	1914.	1919.
Spanish ergot	$0.75	$3.25
Digitalis leaves	.08	.30
Henbane leaves	.08	.65
Colchicum root	.11	1.75
Ipecac root	1.45	2.75
Colchicum seed	.20	2.50
Strophanthus seed, Kombe	.40	1.70
Egg albumin	.40	2.25
Tannic acid	.50	1.40
Acetanilide	.22	.37
Acetphenetidin	.80	2.40
Alcohol	2.48	4.65
Antipyrine	.22	15.00
Cocaine hydrochloride	2.60	9.50
Codeine sulphate	5.50	9.00
Glycerine (1918 60c)	.17¼	.22
Magnesium carbonate, powdered	.04½	.14½
Menthol	2.95	6.50
Calomel	.60	1.59
Morphine sulphate	4.95	11.00
Potassium permanganate	.10	.60
Quinine sulphate	.26	.80
Russian white paraffin oil, medicinal	.45	1.00

Socotrine aloes	.22	1.00
Asafetida, gum	.25	4.50
Camphor	.44½	1.50
Oil coriander seed	7.00	60.00
Oil of mustard, artificial	1.25	10.75
Oil of peppermint	2.75	10.00
Oil of rose	10.00	22.00
Oil of santal wood	4.65	11.25

[With most other drugs quoted the price has practically doubled, which is another illustration of the H. C. of L.—ED.]

Therapeutic Progress, as Shown by Figures. Figures from the Central Hospital Pharmacy to show fluctuation in the consumption of principal medicaments during the past ten years as compared with the previous decennium are presented by M. L. Grimbert.[4]

Certain old remedies present but slight variation. In fact, some of them have not changed at all in twenty years. Such are rhubarb, senna, sodium sulphate, magnesium sulphate, sodium bicarbonate, subnitrate of bismuth, sodium salicylate, sodium nitrate, Kermes mineral and white oxide of antimony.

A remarkable exception to the constancy in the use of ancient remedies is opium, the consumption of which, while practically constant for forty years, has greatly decreased during the last ten years. There has likewise been an enormous decrease in the consumption of alcoholic medication with the exception of Todd's mixture (brandy, egg, sugar and cinnamon water), the use of which has remained constant. Another ancient remedy that for a while seemed almost to disappear from use is cantharides.

Other products, the use of which has diminished, are cacodylate of sodium, arrhenal, petrolatum, lard and starch. Likewise showing decrease are iodide of potassium, bromide of potassium, chlorate of potassium, citric acid, glycerine, liver of sulphur, mercurial ointment, diachylon plaster, cod-liver oil, cinchona wine and extract.

On the increase is the use of sodium benzoate, calcium phosphate, syrup of iodotannin, tincture of iodine, wool fat, and mustard.

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(4) Bull. de 'l'acad. de méd., Sept. 9, 1919.

Calomel, calcium, glycerophosphates, methyl salicylate, and bismuth subgallate have shown marked fluctuations. Among the alkaloids, morphine and quinine have been stationary for twenty years, the latter even for forty years. The use of caffeine has decreased; while, on the other hand, the use of theobromine has increased. There has also been a slight increase in the consumption of codeine.

Chloroform has been stationary and ether shows a marked increase.

The consumption of pyramidon has remained constant, that of antipyrine is going down, that of aspirin on the contrary continues to increase.

A rapid decrease in the use of most of the antiseptics has continued during the last ten years. This includes corrosive sublimate, boric acid, potassium permanganate, biniodide of mercury, phenol, salol, and iodoform. The intestinal antiseptics, betanaphthol and benzonaphthol, have remained stationary after having had a great fall in consumption during the previous decade. Hydrogen peroxide has shown fluctuations, but at present it is diminishing in favor. Formaldehyde, on the other hand, has shown an enormous increase in consumption. Among the new remedies, the consumption of hexamethylenamine, barbital, collargol and protargol has increased. On the other hand, the use of sulphonal and trional has diminished. While arsphenamin has practically held its own, there has been a great increase in the consumption of novarsphenamin.

[It would be an excellent thing if druggists of large hospitals in this country were to give us similar reports of their experience.—Ed.]

Medication in Children. H. B. Sheffield[5] gives the results of his experience and rules of his practice, from which the following are selected:

Digestants occupy but an infinitesimal space in pediatric practice.

The simple bitters fully deserve their striking cognomen, since they are surely very bitter and simple, insignificant, in therapeutic action.

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(5) Med. Record, June 22, 1918.

In pertussis, quinine bisulphate may be given in doses of from 0.06 to 0.12 gm. every two to four hours.

Iron is always useful for children and especially infants fed exclusively on milk, which is poor in iron, and the solution of peptomanganate of iron will be found to act exceedingly well in all simple anemias of infancy.

The syrup of the iodide of iron is an ideal hematinic tonic in children, more especially in secondary anemias following or complicating acute infectious diseases, rachitis and divers forms of glandular enlargement. In the so-called scrofulous affections, it often acts almost specifically, more particularly if combined with cod-liver oil.

Liquid preparations of iron with destructive effect upon the teeth should be avoided. Whenever possible, powdered iron with a little sugar or in tablet form should be given instead. [Sweet tablets of reduced iron or of ferrous carbonate constitute veritable candy medication. —Ed.]

Cod-liver oil, contrary to all expectations, is taken by young children with considerable delight.

In anorexia of children, dilute hydrochloric acid combined with essence of pepsin and small doses of nux vomica often works wonders.

The dilute nitromuriatic acid, in doses of from 2 to 5 drops, well diluted, is indicated as a preventive of the so-called bilious attacks, characterized by recurrent vomiting, headache, and catarrhal jaundice.

The syrup of hydriodic acid is an invaluable remedy in all chronic bronchial affections of children, more particularly in unresolved pneumonia and asthma.

Arsenic is practically useless in the so-called rheumatic or infectious variety of chorea, which calls for absolute rest in bed and salicylates. In the neurotic type of chorea, Fowler's solution may be pushed to its full physiologic effect, provided the urine is carefully watched for a possible renal irritation.

Mercury, the specific in syphilis, may be administered to children by inunction of 0.30 to 0.60 gm. of a 50 per cent. mercurial ointment rubbed in thoroughly once a day, and from 0.004 to 0.005 gm. of protoiodide of mercury three times daily. In the beginning of the treatment, it may be necessary to administer a few drops of paregoric daily to allay intestinal irritation. In newborn infants with congenital syphilis, we may, at first, order 0.006 gm. of calomel every three hours and follow it up with the aforementioned remedies a few weeks later.

Water internally and externally is the best antipyretic in children. Warm tub baths tranquilize the nervous system, equalize the circulation, produce diaphoresis, and reduce the temperature without shock or depression. In highly nervous children antipyretic drugs, such as acetphenetidin, antipyrin, etc., are also indicated; and, if given in moderate doses at long intervals, are perfectly harmless. They may be made fairly palatable in syrup of acacia and orange-flower water.

[An acetphenetidin chocolate tablet may be made as pleasant as chocolate candy.—Ed.]

A moderate dose of antipyretic will often promptly control an attack of convulsions in children, at any rate long enough for the cause to be determined and appropriate remedies employed for its permanent removal.

Small repeated doses of antipyretics, more particularly pyramidon, will frequently subdue grotesque choreic movements when the usual treatment utterly fails.

Salicylates are tolerated by children in larger quantities than by adults; and, if administered with a little caffeine sodium benzoate or strophanthus, are perfectly free from depressing after-effects. On many occasions, Sheffield says, he has had the opportunity to convince himself as well as others of the distinct abortive powers of sodium or ammonium salicylate in acute poliomyelitis. It is more efficient, he states, than immune serum.

The salicylates are valuable in all acute infectious diseases; and, whenever in doubt as to what medicine to prescribe, the physician will almost invariably strike it right by selecting this remedy. It also has the good quality of being palatable.

The safe dose of paregoric for children is one drop for every year of the child's age, and one-tenth of this quantity when the tincture of opium is prescribed. In gastrointestinal affections in which an opiate is indicated preference should be given to Dover's powder (1/10 grain for every year of the child's age), because of the beneficial effect of the ipecac it contains; and whenever vomiting precludes its administration, an opium suppository will be found to act admirably. When very prompt action is desired, as for example, in cholera infantum with profuse vomiting and purging, we may advantageously resort to a hypodermic injection of morphine (0.001 gm.), and atropine (0.0001 gm.). Morphine and atropine hypodermically are occasionally indicated also in uremic convulsions of children. Lumbar puncture should be used in conjunction with them.

Whenever a hypnotic is indicated, codeine added to bromide will act far better than the newer coal-tar products.

Belladonna will be found useful in ordinary catarrhs of the respiratory tract with profuse mucous discharge and in rhinitis of infants when the nasal discharge interferes with nursing. In combination with codeine, in the form of suppositories, belladonna is of particular value in irritable bladder, strangury, and tenesmus. There is no better antispasmodic and anodyne in dysuria accompanying cystitis than hyoscyamine sulphate. The dose is 0.00008 gm. for every year of the child's age, dissolved in syrup of althaea and water.

The author believes that strychnine and strophanthus are indicated in almost all infectious diseases of children; and should be administered early rather than late; 0.0002 gm. of strychnine and 1 minim of tincture of strophantus will ordinarily serve the purpose admirably. In urgent cases, we are often called upon to add caffeine sodium benzoate, and even epinephrine. It is always a good plan to provide the nurse with an ample supply of quick stimulants for a possible emergency during the crisis.

Regarding sterile camphorated oil as a stimulant, more especially in pneumonia, Sheffield has never been convinced of its utility and has often felt that the sorely tried patient ought to be spared the pain and discomfort almost invariably associated with its hypodermic administration. He fears that recently the needle has been grossly abused, be it in subcutaneous injections of drugs or in that of an unlimited number of inert vaccins and serums; though, of course, he firmly believes in the life-saving properties of antidiphtheria and antimeningococcus serums.

Digitalis, while the indispensable remedy in chronic cases with ''ruptured compensation'' is more or less harmful in acute heart disease, with compensation intact, in which an ice-bag to the precordium and small doses of codeine with or without sodium salicylate are indicated.

Aconite, the standby of the homeopath, is a dangerous drug in the hands of the inexperienced. However, in homeopathic doses and well diluted, it probably can do no harm.

Whenever the production of emesis is very urgent, a hypodermic injection of from 0.004 to 0.005 gm. of apomorphine will prove most satisfactory. It is to be regretted that emetics are dropping into disuse, for many a case of acute indigestion in children could promptly be arrested by swift emesis. Moderate doses of ipecac are invaluable in whooping cough with prolonged suffocating paroxysms, thus by emesis imitating Nature in aborting the attack.

In cases of persistent coughing arising from nasopharyngeal or laryngeal inflammation, the physician should be inclined to allay the source of irritation by local measures and administer sedatives to relieve the cough. With this object in view excellent results are usually obtained from daily instillation of from 2 to 5 per cent. of argyrol or silvol in the nose and the internal administration of creosote carbonate and codeine, well mixed with glycerine, mucilage, and water. On the other hand, when dealing with an harassing cough in acute bronchitis or pneumonia in which the expectoration is very adhesive and cohesive, scanty in amount, and hard to raise, a stimulating expectorant, with or without wine of ipecac or the compound syrup of squills will, in the majority of instances, prove beneficial to the patient by assisting Nature to rid the lungs of effete material and save the patient's energy for the terrible battle ahead of him. In chronic bronchitis and unresolved pneumonia, satisfactory results are frequently obtained from ammonium iodide, 0.03-0.06 gm. for every year of the child's age, every 3 or 4 hours, or the syrup of hydriodic acid or syrup of the iodide of iron. The iodides are useful also in the exhausting cough accompanying non-compensated heart disease, and may advantageously be combined with digitalis and an occasional dose of some morphine derivative.

Diuretics are practically useless, nay, often harmful, in acute nephritis while the urinary tubules are obstructed by the inflammatory changes. In such cases, it is much better to produce active diaphoresis by means of packs and hot baths and intestinal flushing. On the other hand, in subacute and chronic nephritis, diuretics must be resorted to whenever the excretion of urine is diminished and a tendency toward dropsy becomes manifest. In such cases, the solution of iron and ammonium acetate seems to act exceedingly well. If, however, the dropsy is extensive and of cardiac origin it is always necessary to fall back on digitalis and strophanthus with or without diuretin or theocin sodium. Another indication for free diuresis is pleurisy with effusion, and this medication should be coupled with abstention from fluids in the diet.

There is no particular reason for giving calomel in divided doses and bothering a child unnecessarily. Any baby can stand a grain of calomel, Sheffield says, without much ado. Effervescent citrate of magnesia is contra-indicated when there is a tendency to vomit, the milk of magnesia being by far preferable.

In treating chronic constipation of children, efforts in the direction of regulation of the diet and induction of regular habits will only too often fail and the physician is frequently called upon to advise a suitable laxative. Sheffield believes that malt extract with olive oil or cascara will answer the purpose in the majority of cases. The value of mineral oil in chronic constipation is greatly exaggerated, at least so far as its efficiency in children is concerned.

Sheffield prefers bismuth subcarbonate to the subnitrate and advises giving the patient from 0.60 to 1.30

gm. after each evacuation. In this manner, it is possible to control the dosage in accordance with the severity of the diarrhea.

In chronic enteric affections, benefit will be derived from daily intestinal irrigations with from 0.25 to 0.5 per cent. of nitrate of silver—in addition to an appropriate diet. Bicarbonate of soda is, of course, the specific in diarrhea due to acidosis or fat indigestion, and should be administered in large doses by mouth as well as by rectum.

Last in line but foremost in importance, when all food or medication is promptly ejected, is settling the stomach. In the majority of instances this is readily accomplished by one large dose of sodium bicarbonate, from 2 to 4 gm. in water, and followed by smaller quantities of bicarbonate of soda and subcarbonate of bismuth with or without calomel.

In recurrent vomiting, lavage is indispensable and in some cases it may even be necessary to resort to a hypodermic injection of morphine. Of course, in all cases of severe vomiting careful attention must be given to the etiology, more particularly involvement of the appendix or brain.

In administering medicines to children, it is often helpful to divide the full dose in several small doses, if need be, giving it drop by drop until the whole teaspoonful has been taken. In this manner even a most irritable stomach will often retain the medication, whereas it would otherwise reject it.

In conclusion, the author gives the following general rules to facilitate the selection and administration of drugs to children:

"1. Never prescribe any medicine unless you are convinced of its necessity; if only a placebo is required, prescribe a palatable adjuvant.

"2. Never prescribe a medicinal preparation requiring a large quantity, when a small one of the same or an equally as useful drug will do the work just as efficiently.

"3. Never prescribe a painful therapeutic procedure or a nauseous mixture when the patient will do equally as well—and surely much better—without the unnecessary pain and annoyance."

[If every observant physician of large experience would publish once or twice in his life a number of aphorisms of practice, what a fund of valuable information would accumulate.—Ed.]

THERAPEUTIC TECHNIQUE.

Disinfection of Needles and Syringes by Means of Liquid Petrolatum. R. Waterhouse[6] advises the employment of liquid petrolatum for disinfection of needles and syringes, used in the following manner:

The upper part of a test tube three-quarters full of liquid petrolatum is heated, moving the test tube up and down in the flame, until currents appear (indicating a temperature of about 150° C.) or rather longer. The heated fluid is then drawn at once into the syringe until it comes into contact with the whole of its interior, and then ejected. The method is simple, rapid, reliable, and devoid of deleterious effect upon the needles. It is particularly valuable for giving intramuscular injections of suspensions of medicament in oil as, for instance, mercurial cream.

Transduodenal Lavage. This method was first described in 1912, by M. E. Jutte,[7] who reports a number of cases of suffering from post-operative vomiting, due to ileus, as well as a case of vomiting due to postpartum eclampsia, and a case of obstinate hiccough following an operation, all of which were relieved by insertion of a duodenal tube just beyond the pylorus and allowing slightly hypertonic salt solution to run through the tube into the bowels in sufficient quantity to produce a thorough flushing. The author considers it reasonable to attribute the prompt relief produced by this procedure in these various conditions to the stopping of the reverse peristalsis and the re-establishment of normal peristalsis, the reverse peristalsis having been brought about by the operation or parturition. Jutte also believes that the toxemia of pregnancy offers a promising field for the employment of transduodenal lavage.

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(6) Brit. Med. Jour., Aug. 2, 1919.
(7) Jour. Amer. Med. Ass'n., March 29, 1919.

[Duodenal intubation offers an opportunity for administration of medicaments against the action of which the stomach must be protected; as, for example, in the case of ipecac.—Ed.]

Subarachnoid Irrigation and Medication. Lewis H. Weed and Paul Wegeforth[8] found that irrigations of the spinal and cerebral subarachnoid spaces are well tolerated by cats if the irrigating fluid is composed of sodium chloride, potassium chloride, and calcium chloride in proper proportions (modified Ringer's solution, made up as follows: NaCl, 0.9 per cent.; $CaCl_2$, 0.024 per cent.; KCl, 0.042 per cent.). If, however, the irrigation be done with isotonic solutions of sodium chloride alone, various toxic effects become apparent. Many of these animals die during or immediately after the irrigation; if this immediate toxicity is survived, convulsve seizures and acute mania are almost invariable. Recovery from such attacks is frequent.

Single irrigation with modified Ringer's solution of infected meningeal spaces has prolonged the life of the animals, as compared with controls. The period of survival in many cases has been doubled as a result of this washing-out of the infected meninges. Multiple irrigations have not been attempted.

The authors tested the toxicity of various antiseptics and found that most of the chemical bodies employed possessed definite toxicity so that unless given in suitable dilution and amount, death of the animal would ensue. With chloramine and flavine, in addition to the initial toxicity, a secondary cause of death in from five to ten days was brought about through direct injury to the central nervous system. With the injection of small amounts of a suitable dilution the animals remain apparently normal but all have shown at autopsy pathologic changes in the meninges.

The lesion consists of a more or less complete obliteration of the meningeal (subdural and subarachnoid) spaces with serofibrinous exudate; in the more severe cases the nervous system becomes involved in a process of destruction by direct continuity from the meninges.

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(8) Jour. Pharm. and Exp. Therap., July, 1919.

The blocking-off of the subarachnoid space was complete in only one case, as demonstrated by the subsequent injection of ink. It was not, however, sufficient for the localization of the infection. The subarachnoid injection of lysol and of potassium permanganate in the presence of an otherwise fatal meningeal infection, did not prolong the life of the animal.

[This opens up a new prospect in the treatment of meningitis—namely, irrigation; and ought to lead to the discontinuance of the certainly useless and often harmful attempts at antiseptic medication of the subarachnoid space.—Ed.]

Intravenous Injection of Substances Insoluble in Water. Paul Chevallier[9] arrived at the conclusion that, if one desires the foreign substance to get into the most intimate possible relation with the tissues, one should introduce it in a form insoluble in the blood stream (but capable of transformation in the organism). Such substance will remain much longer in the system than one that is soluble. If, on the other hand, a stormy action is wanted, soluble substances should be injected. If, for instance, a soluble salt of iron be injected, it is promptly eliminated from the body. If, on the other hand, the iron be injected in insoluble form, it accumulates in the system and becomes gradually assimilated. Injections of calomel have shown a remarkable activity.

Chevallier introduced as much as 10 c.c. of a suspension of talcum powder, as concentrated as possible, into the ear vein of rabbits without more than transient disturbance. Not only is the intravenous injection of colloidal metal harmless—in this case we have to deal with a very minute quantity of solid as compared with the amount of water—but even quite concentrated suspensions of such substances as ferric hydrate, silica, hydrocarbonate of cobalt, and oxide of nickel have been injected without the production of embolism. The elimination of such solids introduced into the blood is extremely slow. Most of it accumulates in fixed connective elements and in macrophages which multiply in order that

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(9) Presse méd., June 20, 1918.

they may take them in. Thus, one can, for example, color a guinea-pig completely blue by means of trypan-blue of Ehrlich. Talcum accumulates in the vascular spaces of the muscles of the extremities, producing veritable calcareous lines.

Influence of Various Solvents on the Cutaneous Irritation by Mustard Oil. Torald Sollman[1] applied 1 per cent. solutions of mustard oil in various solvents to the inner surface of the forearm by saturating a small pledget of cotton with the solution, and fixing this to the arm by a few turns of bandage. This was left in place for five minutes.

Very striking and constant differences were observed in the degree of hyperemia, according to which the irritant efficiency of the 1 per cent. solutions or suspensions of mustard-oil in the various solvents is as follows:

1. Olive oil. Practically no hyperemia.
2. Turpentine. Practically no hyperemia.
3. Ether. Very little hyperemia.
4. Absolute alcohol. Very little hyperemia.
5. 95 per cent. alcohol. Distinct hyperemia.
6. 50 per cent. alcohol. Marked and lasting hyperemia.
7. Mucilage of acacia. Most intense and persistent hyperemia.
8. Simple syrup. Most intense and persistent hyperemia.

In interpreting the results, the author says: "Emollient and demulcent action play no essential part; for the viscid olive oil (1)* and the mobile turpentine (2) prevent the irritation about equally; while the mobile 50 per cent. alcohol (6) and the viscid mucilage (7) favor it almost equally.

"Concentration of the mustard-oil by the evaporation of the solvent plays a very subordinate part, as seen by the comparison of the olive oil (1) and ether (3); and of the 50 per cent. alcohol (6), and the mucilage (7). However, it may explain the slight differences between the volatile ether (3) and the absolute alcohol (4), on the one hand, and the non-volatile olive oil (1) and the turpentine (2), on the other hand.

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(1) Jour. Pharm. and Exp. Therap., April, 1918.

* The numbers correspond to the position of the drug in the series.

"The true explanation of the difference is evidently the affinity of the vehicle for the mustard oil. The greatest irritation occurs in the watery mixtures in which the mustard oil is merely suspended (6, 7 and 8).

"In the alcoholic solutions (4, 5 and 6) the irritant efficiency increases directly with the percentage of water.

"This relation of the irritant efficiency to the solution partition-co-efficient is strictly analogous to the effects of solvents on the penetration of phenol into the skin. In both cases, the irritant distributes itself between the solvent and the skin in proportion to its solubility in these two media."

ETIOTROPIC THERAPY.

Bactericidal and Bacteriostatic Substances. The attempt to make the word "antiseptic" mean "a substance capable of inhibiting the growth of microörganisms in doses inoffensive to the issues," seems to have failed. One finds this word used so loosely in general literature, that one might well despair that it can ever be confined to the connotation proposed for it.

Hence, it seems desirable to use the word "bacteriostatic"—a term proposed by Basil Gildersleeve—for the word antiseptic, in its limited sense. For, while etymologically the latter term might just as well be used in a general sense as a substance antagonistic to microörganisms even to the degree of killing them—and probably ought to be—the derivation of the word "bacteriostatic" makes it plain that mere inhibition of development is meant.

CHLORINE PREPARATIONS.

An Automatic Distributor for Neutral Solution of Chlorinated Soda (Dakin's Solution). The following apparatus, which is easily made in any hospital laboratory, is described by L. J. Strong.[2] The essential device consists of "a large size test tube, D, of about 100 c.c. capacity, fitted with a three hole rubber stopper. This test tube serves as a reservoir to collect the solution from the drop tube. Through one hole of the stopper a piece of glass tubing, placed so that it extends the entire length of the test tube, controls the pressure in the test tube when emptying and filling" (Fig. 1).

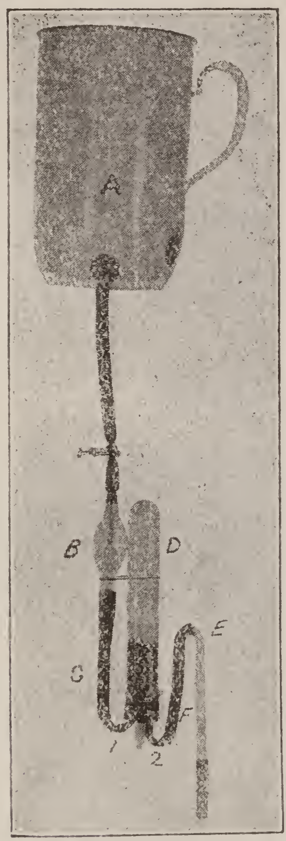

Fig. 1. Automatic distributor for neutral solution of chlorinated soda.

"U Tube 1 is connected with the outflow from the drop tube by a rubber tube, C. U Tube 2 is connected with U Tube E, which has one long arm and one short arm. This rubber tubing should be long enough for U Tube E to be elevated or lowered a distance equal to the length of the test tube. Raising U Tube E increases the quantity of fluid discharged into the wound. For example, to deliver 80 ml. every two hours, the drip is set at 10 drops a minute. U Tube E is set three-quarters up the test tube.

"The long arm of U Tube E connects with regularly used Dakin's tubes that are planted in the infected wound.

"As fluid runs from the can through the drop tube, it is conveyed by Tube C into the test tube, which stops it from flowing into the wound until is reaches the level of U Tube E. When it reaches this level a siphon is formed, and the quantity of fluid in the test tube is expelled at one time into the wound."

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(2) Jour. Amer. Med. Ass'n., Nov. 9, 1918.

Max Bornstein[3] describes another apparatus blown entirely of glass and fused into a compact piece to serve the same purpose as the one just described (Fig. 2). "Two bells (A and B) annealed one to the other are connected by a siphon tube (C). A drip point is annealed into the upper end of the upper chamber. Both chambers have air vents."

"The apparatus works as follows: Solution from an irrigating bottle or bag is allowed to pass a pinch-cock at a fixed rate. It accumulates in the upper chamber until it reaches the highest point of the siphon, when it suddenly is emptied by the siphon into the lower chamber. Here, by virtue of its height and its weight, it forces its way through the holes in the Carrel tube and flushes the wound. The flushing is periodic and eliminates the inconstant human element which is so often the cause of failure in the Dakin-Carrel technique."

Relative Irritant Properties of the Chlorine Group of Antiseptics. In sterilizing infected wounds with hypochlorite solution one of the most important problems has been that of avoiding excessive irritation. Dakin found that sodium hypochlorite solution could be used clinically if its concentration was not greater than 0.5 per cent. and if the excess alkalinity of the solution had been reduced until there was no longer color with powdered phenolphthalein.

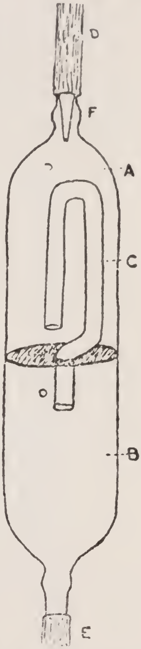

Fig. 2. Glass automatic siphon, for delivering a definite amount of fluid to the wound at a definite period of time: *A* and *B*, upper and lower chambers; *C*, siphon tube; *D*, tube leading to solution tank; *E*, tube leading to Carrel tube; *F*, drip point.

In view of the many modifications of Dakin's original solution, that have been proposed, Glenn E. Cullen and Herbert D. Taylor[4] considered it desirable

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(3) Jour. Amer. Med. Ass'n., June 15, 1918.

to gain some idea of their relative irritant properties. The authors emphasize the fact that Dakin's hypochlorite solution adjusted to the end point of powdered phenolphthalein is not a neutral solution as it has often been described, but is a solution with an alkalinity of about 1,000 times that of water (pH—10.2). Moreover, there is a lower limit of alkalinity, at about 100 times that of water (pH about 9), below which this solution becomes too unstable for clinical use. Powdered phenolphthalein alone is not a sufficient criterion of the reaction, but is the test for the upper limit of alkalinity. The end-points of alcoholic phenolphthalein (pH of 8.5

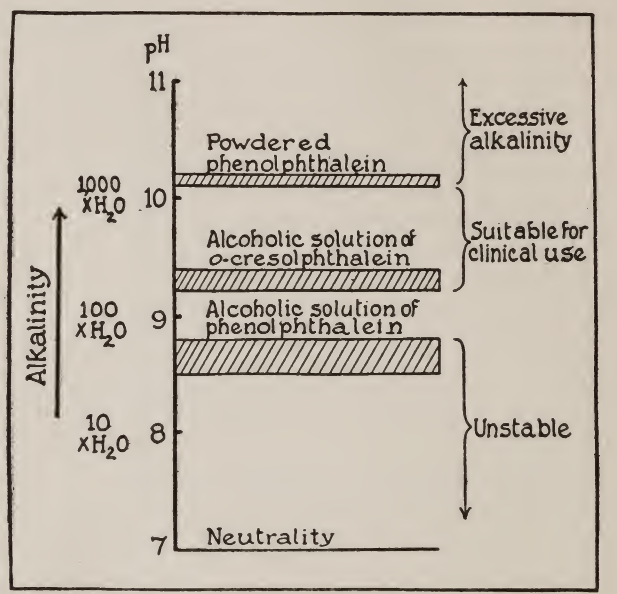

Fig. 3. Approximate alkalinity of a 0.5 per cent. sodium hypochlorite solution at end-points to phenolphthalein and *o*-cresolphthalein. Also the relation between alkalinity of solutions and their availability for clinical use. Alkalinity is expressed in terms of hydrogen ion concentration (pH) and compared with that of water.

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(4) Jour. Exper. Med., December, 1918.

to 8.8) or o-cresolphthalein (pH of 9.2 to 9.4) can be used as tests for the lower limit of alkalinity. It is desirable, therefore, to adjust the solution to these upper and lower limits. The relation between these limits is expressed graphically in Figure 3.

The authors used the ears of rabbits, immersing them in solutions for a fixed time daily for consecutive days. They found that 0.5 per cent. sodium hypochlorite solutions have minimum irritant effects over a range of alkalinity of from about 100 to 1,000 times that of water (pH about 9 to 10), to which solutions may be adjusted by use of the end-points of powdered phenolphthalein, of alcoholic solutions of either o-cresolphthalein or phenolphthalein.

Solutions that have an alkalinity less than that indicated by the end-point of alcoholic phenolphthalein solutions (pH of 8.5 to 8.8) or greater than that indicated by the end-point to powdered phenolphthalein (pH of 10.2) are intensely irritating.

Two per cent. chloramine-T solution has no irritant action.

Five per cent. dichloramine-T in chlorcosane and chlorcosane alone irritate rabbit ears to a slight degree only.

[It must be borne in mind that these conclusions are only correct as applied to the skin, and that they have a bearing on the relative irritant properties of these solutions; but that to the mucous and serous membranes such fluids may be highly irritant, as is shown by the next communication.—Ed.]

Antiseptic Irrigation Harmful in Empyema. W. T. Dodge[5] arrives at the opposite conclusion from that of J. G. Sherrill,[6] who reported favorably on this treatment, on the basis of further observation of the very cases reported on by Sherrill.

Fifty-three patients had been treated, with twenty-three deaths; simple thoracotomy had been performed forty-nine times, and rib resection four times. All were treated with open drainage and the instillation of sur-

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(5) Jour. Amer. Med. Ass'n., June 21, 1919.
(6) Surg., Gynec. and Obstet., April, 1919.

gical solution of chlorinated soda (Dakin's solution). These patients were ill for a long time, and eventually the use of Dakin's solution was discontinued, and instillations of 2 per cent. formaldehyde solution in glycerine (containing approximately 0.07 per cent. of absolute formaldehyde) were substituted. Immediate improvement took place, the septic condition disappeared, the patients put on flesh, and it was confidently expected that they would speedily recover.

When Sherrill was transferred from the hospital, all the patients who had been under his care had apparently recovered. Fifteen of these patients recovered under the use of Dakin's solution and were discharged. Fifteen remained under treatment after the change was made to formaldehyde-glycerine solution. The wounds closed in four patients who were returned to duty and not heard from again at this hospital. In five of the remaining eleven, the wounds also closed and these patients were discharged, but in a few weeks were re-admitted with re-opened sinuses leading into the pleural cavity. During August, these eleven patients were subjected to costatectomy, after a study of their chests in the Roentgen-ray laboratory. This was done by passing a small catheter through the sinus and introducing a solution of potassium iodide. This procedure outlined the cavity as viewed through the fluoroscope. In each case large quantities of partically organized lymph and pus were found in the pleural cavity. Two patients are still in the hospital after more than a year, and each presents a small sinus through the thoracic wall. Each has had several operations for the purpose of collapsing the chest wall, and at present is convalescing and will soon be ready for discharge.

For the next series, it was decided that the early treatment, aspiration and instillation of formaldehyde-glycerine solution, be given a fair trial. The use of the aspirator soon convinced Dodge that this was not an entirely harmless procedure. Also the instillation of formaldehyde-glycerine solution was found to be without beneficial effects. He then limited the use of the aspirator to diagnostic purposes, and, after the fluid became purulent, opened the chest by resection of one rib and introduced two large drainage tubes.

In no case were instillations into the pleural cavity permitted during the first ten days. Cases presenting profuse and offensive discharge were then treated with instillations. Dakin's solution was used in five cases; formaldehyde-glycerine solution in five cases, and simple flushing with 50 per cent. solution of glucose in a considerable number.

Eventually, the use of all irrigating solutions except that of physiologic sodium-chloride solution was abandoned, because the ten patients treated with Dakin's solution and the formaldehyde-glycerine solution were found, after several months, to have partially collapsed lungs and cavities of considerable size. They were subjected to secondary operations, and in each case a very thick layer of organized lymph was found holding the lung in a state of partial collapse. Ribs were removed and numerous incisions were made across the confining layer of lymph; four of the patients are now convalescing and the others are ambulatory and in good physical condition.

Similar experience is reflected from a private letter received from Major F. C. Warnshuis, who received from another service eleven active empyemas, and five cases healed. In going over the histories he found that the eleven empyema patients had been treated with Dakin's solution, while the five healed empyemas had not.

Dodge further treated three cases according to Capt. A. E. Mozingo's "closed method." This consists of introducing a small rubber tube into the pleural cavity through a cannula or by puncture through the chest wall with a pair of forceps, evacuating fluid by suction with bulb syringe introducing Dakin's solution, withdrawing it again by means of a bulb and repeating this procedure at intervals of two hours for several days, after which formaldehyde-glycerine solution is instilled through the tube after the irrigation with surgical solution of chlorinated soda. In the interval, the tube is closed by a shut-off and no air at any time is permitted to enter the pleura. In all three cases, the wound closed spontaneously. The Roentgen-ray laboratory reports, however, were not reassuring, as each examination revealed gradually increasing amounts of fluid in the pleura, and no evidence was found that the collapsed lungs were expanding to fill the space. One month after the closure of the openings in the thoracic wall, the fluoroscope disclosed fluid in each case up to the level of the third rib. The aspirator revealed the presence of pus, which in one cause resulted in a culture of hemolytic streptococci. In two cases, culture was negative. Rib resection was performed in these three cases, and very large cavities were discovered. The same firm-appearing layer of organized lymph confined the lungs in compression, as had been found in all the other cases treated by instillation of irritating antiseptics. Dakin's solution, as well as formaldehyde-glycerine solution, causes the development of large cavities due to irritation of the serous membrane and the formation of thick and resisting lymph deposits, assisting in blocking off the system from the infecting organism, but in so doing effectually binding down the collapsed lung. It is greatly to be regretted that this is so, because it is the most agreeable method of treatment to use in the early stages.

The conclusions arrived at by Dodge are that the presence of fluid in the pleura is at first protective to the diseased lung, and it should not be removed at an early period, unless it is replaced, in part, by some other fluid.

If the patients survive the pneumonic process and the fluid becomes purulent, it should be drained through a large tube introduced after a rib resection under a local anesthetic, and under no circumstances should this procedure be adopted before the twelfth day of the disease and as early as that only under exceptional circumstances.

Drainage having been established at the most dependent point in the cavity, irrigations with, or instillations of, irritating chemical solutions should be abstained from. If the drainage is adequate they will not be required. If not adequate, flushing with physiologic sodium-chloride solution will be all that will be necessary.

Dichloramine-T the Best Dressing for Wounds. David T. Huston[7] reports that dichloramine-T has given better results than any other germicide so far used. It combines simplicity, cleanliness, and speed in dressing. The solution used is a 5 per cent. dichloramine-T in chlorcosane, except in burns, when a 2 per cent. solution was used, 5 per cent. causing too much distress in such cases.

His specifications for successful use are as follows: "The instruments required are a pair of dressing forceps, scissors, glass eye-dropper, a long pipette, made to fit a Luer syringe, swab sticks, paraffined mosquito netting, and gauze.

"Rubber gloves should be worn and forceps used to handle all dressings.

"The edges of the wound and surrounding tissue are first swabbed off with the dichloramine-T solution; the wound itself, if possible, is then swabbed with the solution, care being taken to get in all the crevices. This is followed by completely bathing the wound with the solution by dropping from an eye-dropper; or, if there be a sinus, by instilling the dichloramine-T with a dropper or, if the sinus be too narrow, by means of a pipette attached to a Luer syringe.

"The paraffined gauze is then put directly over the granulating surface, covered with gauze of several thicknesses, and held in place with a bandage or adhesive plaster.

"In deep wounds it has been found that the paraffined gauze should be folded so as to make a gutter or wedge, the gauze drainage inlaid in this, and the gauze dressing applied. In every case in which drainage is used paraffined gauze is put directly over the drainage whether it be gauze or rubber tubing. This prevents the drain from adhering to the dressing."

Rubber tissue was found to block up the wound and instead of draining was really plugging. Rubber tubing is advocated only where the quantity of pus is great,

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(7) Therap. Gazette, February, 1919.

and the wound large. In most instances it was found that the tube was blocked up and that pus was escaping around the sides of the tube.

Nearly always gauze, soaked in dichloramine-T solution and loosely packed in the wound, gave the best results. The sprayer originally advocated was found to be of little use, the quantity of solution it sprayed being negative and the time consumed making it more of a hindrance than a help. The solution dropped from a pipette is more efficacious.

In a few cases there seemed to be an idiosyncrasy. Dermatitis was controlled with sodium bicarbonate, given internally. That the sodium bicarbonate really did control this condition was demonstrated by the fact that when it was discontinued the dermatitis would promptly begin, and when again started would disappear.

All manner of infected or pus-producing wounds were treated with most satisfactory results.

Daily dressings were found all that was necessary, and the soaking of the dressing between times seemed unnecessary.

Dichloramine-T Dressing for Burns. Torald Sollmann[8] reports an experimental search for an ideal dressing for burns, one that would have all the advantages of a petrolatum dressing without furnishing, as this does, protection to the bacteria as well as to the tissues, causing superficial infection to flourish, and the healing to be delayed. Dichloramine-T was chosen as the best antiseptic for this purpose, but it was found that commercial petrolatums are highly destructive for dichloramine-T; so much so, that the efficiency is at once practically completely destroyed. On the other hand, a "paraffin ointment, 3:7" prepared by mixing 30 parts of melted surgical paraffin wax with 70 parts of liquid petrolatum (Stanolind brands) caused considerable deterioration on mixing, but a practical efficiency was maintained for a week. Such dressing might therefore be advocated, or a 2 per cent. solution in chlorcosane overlaid with paraffin ointment 3:7.

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(8) Jour. Amer. Med. Ass'n., April 5, 1919.

Sollmann also points out that liquid petrolatum can be used in emergencies as a vehicle for dichloramine-T, although it is inferior to chlorcosane.

The Germicidal Power of Antiseptic Oils and of Substances Dissolved in Oil. This subject was studied by Philip D. McMaster[9] by means of agar slants inoculated with *B. typhosus* and incubated for 24 hours. The oily solutions were then poured over these so as entirely to cover the agar and the tubes allowed to stand 24 hours in the incubator at 37.5° C. The oily solutions were then poured off and the tubes twice washed out carefully with sterile salt solution. A transplant was then made to a tube containing 8 c.c. standard broth and readings made after 24 and 48 hours' incubation.

Solutions of phenol, made in paraffin oil and in water were tested simultaneously, with the following result:

In paraffin oil, phenol kills at 0.4%; not at 0.3%
In water, phenol kills at 1.0%; not at 0.9%

Control tubes in which paraffin oil alone was used, gave growth in all instances. The following data given by McMaster are of interest:

Substance tested.	Lethal point %	May kill %	Does not kill %	Co.-efficient
Phenol in paraffin oil	0.4	0.3	0.2	1.00
Iodine in paraffin oil	0.4	0.3	0.2	1.00
Phenol in cotton seed oil	2.5	2.0	1.0	0.16
Paracresol in paraffin oil	0.25	0.2	0.1	1.55
Guaiacol in paraffin oil	0.9	...	0.8	0.44
Dichloramine-T in 10% chorinated eucalyptol in chlorinated paraffin oil	0.05	...	0.03	8.00
Dichloramine-T in plain paraffin oil	0.4	...	0.2	1.00

Experiments with menthol, camphor and turpentine resin showed that these did not kill in the highest concentrations that could be obtained.

A comparison of the time required for disinfection was made for dichloramine-T, and phenol. In six hours the dichloramine had exerted its full action while the

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(9) Jour. Infect. Dis., April, 1919.

phenol required over twelve hours. Hence, the coefficiency of dichloramine-T would be even higher than 8.

[The real disinfecting value of dichloramine-T dissolved in chlorinated liquid petrolatum is greater yet than indicated by above figures, as its toxicity to the host is very much less than that of phenol.

The generalization that oil-soluble disinfectants lose much in disinfectant power on solution in oil, while true for other oils, as is shown by the low value of phenol in cotton seed oil, does not obtain for solutions in liquid petrolatum. Thus, phenol-petrolatum solution is more than twice as active than aqueous solution of phenol, as shown above. This demonstrates the danger of careless generalization, on the strength of which, for instance, phenolated petrolatum was condemned as worthless.—Ed.]

IODINE PREPARATIONS.

Iodine Tinctures, Water Soluble. The tincture of iodine U. S. P. is compared by T. Sollmann[1] with two widely advertised proprietary preparations—Burnham's Soluble Iodine and Sharpe and Dohme's Surgodine.

The actual results indicated that Burnham's preparation was the more irritant, and the U. S. P. tincture (reduced to the same iodine percentage) was the less irritant; but the differences were so small that they could easily be accidental.

The potassium iodide of the official tincture has a restraining effect on the coagulation of protein. This would tend to make it less irritant than the other preparations. The more even spreading and the more rapid coagulation of protein render the simple alcoholic solution of iodine (the tincture of the old U. S. P.) probably the best for disinfection of the skin; while the delayed protein precipitation by the U. S. P. tincture would probably render this somewhat superior for the disinfection of open wounds. The secret and non-secret ''water-soluble tinctures'' do not appear to have any material advantages.

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(1) Jour. Amer. Med. Ass'n., Sept. 20, 1919.

The Disinfectant Value of Iodized Xylol. Louis Bory[2] reports a series of clinical observations on the value of iodine dissolved in xylol in dermatologic and venereal practice. Xylol which is dimethyl benzine is an energetic fat solvent, extremely diffusible, and a powerful antiseptic. He recommends the following formula:

Iodine	1.0 gm.
Xylol	15.0 to 20.0 ml.
Petrolatum to make	100 gm.

Dissolve the iodine in the xylol and add it drop by drop to the petrolatum while triturating in a glass mortar.

This forms a most efficient application against pubic lice, one treatment being generally sufficient. It should replace the offensive and occasionally dangerous mercurial inunction.

All mild infections of the skin are rapidly cured by two or three applications of this product. It is a most efficient remedy in cutaneous trichophytosis (herpes circinata, inguinal epidermophytosis, sycosis). In sycosis, whether due to mould or microbe, it is the efficacious complement of epilation, but must not be applied at the beginning of the treatment, when the surface is purulent and highly inflamed. Bory always uses it after three, four or more days of treatment with compresses of Dakin's solution. After three or four days' treatment with iodized xylol, it is often well to change for a day or two to compresses with Dakin's solution, bismuth crème, or a salicylate paste, strong or feeble.

He uses this remedy daily in impetigo, echthyma, folliculitis and even in subacute (but not in acute) eczema.

He advocates it as a primary dressing for war wounds, substituting liquid petrolatum for the soft form, and using it to saturate the wound and the compress covering it.

In venereal prophylaxis, he considers xylol combinations superior to the older calomel ointment, which he has found at times disappointing.

He gives the following formulas.

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(2) Presse méd., Feb. 10, 1919.

Iodized Xylol Pencil.

Iodine	3 gm.
Xylol	15 gm.
Wax	32 gm.
Olive oil, washed with alcohol	50 ml.

Perfume, as desired.

Calomel Xylol Pencil.

Calomel	38 gm.
Xylol	12 gm.
Wax	16 gm.
Olive oil, washed with alcohol	20 gm.

Perfume, as desired.

Either of these is to be applied before coitus and after thoroughly soaping the part and drying it. A second inunction should follow immediately afterward.

For the female he advocates the following ointment:

Calomel	40 gm.
Xylol	20 gm.
Petrolatum	20 gm.
Hydrous wool fat	20 gm.

He also finds xylol an excellent solvent vehicle for iodoform, which dissolves in it to the extent of 10 per cent.

He recommends the following formula for chancroid and buboes after incision:

Iodoform	1 gm.
Xylol	10 gm.
Petrolatum	40 gm.

To be used freshly made.

Intravenous Use of Iodine. D. M. Baillie[3] used tincture of iodine intravenously in doses of from 20 to 30 minims (22 m. = 0.03 gm. of iodine), diluted with 9 c.c. of an 0.85 per cent. solution of salt in freshly distilled water and given in the same fashion as a neoarsphenamin injection—once daily for several days in ten bad cases with definite signs of influenza bronchopneumonia. Of these, nine patients recovered and one died. The drug was tolerated very well, and there were no untoward

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(3) Lancet, March 15, 1918.

symptoms except that two patients had a rigor about an hour after the first injection and another case developed a typical iodine rash.

The therapeutic effect of the iodine was generally shown within 20 hours by a marked fall in the pulse-rate and temperature (the latter resembling a crisis) and a marked change for the better on the part of the patient. The presence of albuminuria was no contra-indication as to the use of the iodine; dense albuminuria in one case cleared up two days after the first dose.

While it is highly improbable that the iodine given thus into the blood-stream has any direct bactericidal action, it is feasible to think that it may have an inhibitory effect on the reproduction of the organisms, at any rate in the blood-stream.

[This is doubtful. It might have an expectorant value, for which oral administration of iodide would probably be just as efficient.—Ed.]

The Use of Iodine in Influenza. Iodine is considered a remarkable, almost specific, remedy in influenza by L. Boudreau.[4] He administers tincture of iodine in doses of 10 drops constantly and at least every hour, without intolerance, as might be expected from theoretic considerations. The medicine is taken in any kind of fluid vehicle. He advises against small or "prudent" doses; and rather recommends proceeding vigorously as, if an intolerance should perchance manifest itself, it will be after the disease has been conquered.

He even advocates iodine as a prophylactic against the contagion of influenza and says, regarding it, that one should not only take it but take enough.

SILVER PREPARATIONS.

Classification of Organic and Colloidal Silver Compounds. Torald Sollmann[5] attempts to classify the large number of silver protein compounds now on the market and finds that collargol, argyrol and protargol

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(4) Jour. de méd. de Bordeaux, November, 1918.
(5) Jour. Amer. Pharm. Ass'n., August, 1918.

represent quite distinct types, under which most of the other compounds may be arranged.

To these needs be added a group containing free silver ions. These precipitate ordinary proteins and are therefore highly irritant to the tissues. Compounds containing their silver in non-ionized or "masked" or "colloidal" form do not precipitate and, therefore, largely avoid the irritation. This is the main object in the therapeutic use of these silver compounds. All but two of the preparations tested contain all of their silver in non-ionized form; and these two (albargin and Roche silver nucleinate) contain only a small, but not negligible, amount of ionized silver, presumably as a contamination.

According to *total silver content,* the three typical compounds, collargol (78 per cent.), argyrol (20 to 25 per cent.) and protargol (8.3 per cent.) are distinctive; most of the other compounds approach one or the other of these types.

Irritation. This is perhaps the most important criterion for a clinical classification. It is easily judged by placing a few drops of the 1:10 watery solutions in the nostrils, and in case of doubt also in the conjunctival sac. The differences are sufficiently striking to permit arrangement into three groups, as in the accompanying table (Table I).

TABLE I—IRRITATION.

No Irritation.	*Slight but Distinct.*	*Marked Irritation.*
Argyrol	Protargol	
Argonin (5%)	Heyden Silv. Prot.	
Silvol	Cargentos	Albargin
Sophol	Silv. Nucl. Roche	
Squibb Sil. Prot.	Silv. Prot. Roche (very slight)	
Novargan	Hegonon (very slight)	
Collargol		
Collargol Old (5%)		
Solargentum		

Albumin Precipitation: This is, in a sense, an index of astringency. It is an objective confirmation of the distinct though slight astringent action of all the members of the protargol type (protargol, Roche and Heyden silver proteinate, and hegonon); and of the marked astringent action of those containing free silver ions (albargin, Roche silver nucleinate).

The author concludes with making the following classification:

The Collargol Group: Comprising collargol and cargentos.

The Argyrol Group: Argyrol, Squibb's silver proteinate, sophol, silvol, solargentum.

The Protargol Group: Protargol, Roche's silver proteinate, Heyden silver proteinate and hegonon.

The Free Silver Group: Albargin and Roche's silver nucleinate.

The Pale Group: Novargan and argonin.

Incidentally he calls attention to the fact that, the *specific gravity of 25 per cent. solutions* of some of these compounds being high, some ophthalmologists use the protein-silver compounds, especially the argyrol type, for their specific gravity rather than for their antiseptic effect, the idea being that the heavier silver solutions would displace the secretions, pus and bacteria by gravity. Some such mechanical action would doubtless occur, if the patient were placed in the proper position; but, if this has any value, it would be obtained equally well and much more cheaply, by a 25 per cent. solution of acacia.

Use of Argyrol in the Eye. H. D. Bruns[6] finds argyrol a useful agent when employed as follows: A strength of 2 or 2.5 per cent. possesses the valuable properties of the drug and reduces to a minimum all unpleasant or harmful effects. Such a solution is unirritating, seems to be most diffusible—and great diffusibility is one of the valuable properties of argyrol—while its specific gravity is sufficient to float out of the cul-de-sac every particle of pus or mucus. The coloration it imparts to such otherwise invisible particles makes argyrol a very useful adjuvant in thoroughly cleansing the eye when alternated with a borax wash or a neutral solution. Solutions of from 25 to 50 per cent. in strength are, by their thickness, made less diffusible;

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(6) New Orleans Med. and Surg. Jour., April, 1919.

they seem to form with the secretions uncomfortable clots, and they are irritating; so irritating that after a few instillations it is hard or even impossible to persuade the patient to continue their use.

The intervals at which the solution is instilled must be short if we are to achieve the results for which we hope. Instillations should be made every hour; in the severest affections every fifteen minutes, and in the mildest at least every two or three hours.

The use of argyrol must never be long continued. Probably two weeks is the utmost length of time it can be used with benefit. After that, even the weaker solutions begin to irritate the conjunctiva. We must not forget that argyrol is no astringent. By undue persistence in its use we can produce one of the very mischiefs—irritation of the conjunctiva—that we are seeking to subdue.

Only fresh solutions made from fresh material can be used, even in the weaker solutions, without producing redness, smarting and watering of the eyes.

Thus employed, argyrol is useful in cleansing the conjunctival sac, especially before operations, in cases of beginning epiphora without obvious cause; in the treatment of simple corneal ulcers, erosions, excoriations; in mild cases of conjunctivitis, alternated with a borax-wash. Bruns also uses it in cases of Koch-Weeks bacillus conjunctivitis—in 10 or 15 per cent. solution alternated every hour or two with a solution of zinc sulphate of 0.03 to 0.06 gm. to 30.0 ml., depending on the severity of the case.

In cases of ophthalmia neonatorum, Bruns finds a 10 to 15 per cent. solution an efficient remedy, when instilled day and night, with the patient recumbent and the lower lid gently drawn down with the finger on the cheek. The argyrol solution is instilled into the unaffected eye half as often as into the diseased one—every other time. As argyrol is without astringent action, after all swelling and pus have disappeared for a day or two, he generally begins the application of weak silver nitrate solution to the everted lids, continuing until the conjunctiva has become normal.

The author has records of fifty-nine cases of gonorrheal ophthalmia, with satisfactory results.

He believes that most striking proof of the value of the treatment to be the fact that, although no attempt was made to protect the healthy fellow-eye, save by dropping into it the argyrol solution, no unaffected eye ever became infected during the course of treatment. There have been but two cases of staining of the cornea by argyrol. In both the area was minute.

COPPER.

The Therapeutic Uses of Copper Sulphate. De Hérain[7] finds copper sulphate a most valuable skin remedy, most especially in infectious dermatoses. Depending on whether they are irritable or non-irritable, it is necessary to vary the formula, using the strong salve for such conditions as favus, tricophytosis, papilloma, seborrheic eczema, ecthyma, furuncle anthrax, infected wounds and ulcers, chancroids and buboes. In these affections he employs the following formula:

Copper sulphate	20 gm.
Dissolved and incorporated with wool fat.	
Zinc oxide	150 gm.
Wool fat	100 gm.
Petrolatum, enough to make	1000 gm.

If this seems too strong, the amount of copper sulphate is reduced one-half.

A salve containing only 0.2 per cent. of copper sulphate, but otherwise of the same composition, the author advises in more irritable dermatosis, such as eczema, impetigo, sycosis, acne rosacea, burns, non-infectious ulcers and in herpes zoster.

He also employs copper sulphate in powder form on chancres, incised buboes, and sores, using a powder of the following composition:

Copper sulphate	20 gm.
Dissolve and incorporate with:	
Talcum	1 kg.

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(7) Presse méd., Oct. 31, 1918.

A powder containing only one-tenth of this amount of copper sulphate he recommends in excessive sweating, burns, superficial sores, eczema and cuts.

He also uses intravenous injections of copper sulphate in infectious conditions in which he considers the local application insufficient. Thus, he believes that he has been able frequently to abort buboes by intravenous injections. Furunculosis, he states, is rapidly and certainly arrested by a series of intravenous injections; likewise is anthrax immediately improved by this treatment. For these injections he uses ampoules containing 5 ml. of a soluton of 0.5 per cent. in distilled water. Stronger solution is not advisable because of danger of thrombosis. De Hérain injects 5 ml., and often as much as 10 ml., of such solution (corresponding to 0.05 gm. of copper sulphate). In serious cases he repeats the injection twice a day for eight, ten, fifteen or even more days.

In eczema daily baths are employed with a solution of 0.10 gm. per liter and the application of the mild salve and powder alternately during the intervals. Baths and powder are most active in moist eczema. In rebellious conditions a lotion as strong as 0.25 gm. per liter is employed. He recommends similar treatment in juvenile acne.

A solution of 0.10 gm. per liter has been used with great success in ocular infections.

In intestinal infections. De Hérain employs cachets or pills (0.05 gm.) of copper, giving from three to six a day. The cachets have the following composition:

Copper sulphate	0.03 gm.
Prepared chalk	0.25 gm.

To be taken during the meal, using two or three cachets daily.

He finds that the gelatine coated pills are often better borne by the stomach than the cachets, which sometimes produce vomiting. This treatment has, according to this author, a marked antiseptic, even bactericidal power, similar to that of benzonaphthol or lactic acid bacillus.

He has obtained good results in amebic dysentery by the combined use of cachets or pills, enemas of 300 ml. of a solution of 0.25 gm. per liter, and intravenous injections.

VOLATILE OILS.

Santal Oil and Potassium Permanganate Treatment of Gonorrhea. A routine course of treatment for ordinary, early and uncomplicated cases of gonorrhea in otherwise healthy men, as employed at Camp Logan is described by J. B. Clark.[8] The treatment is, of course, interrupted in event of complications or of intolerance.

During First Two Weeks: In bed from four to eight days, then "up" if inflammation has subsided. Bland diet. Two-glass test each morning with first urination. Smear on Monday and Thursday mornings, before urination. Sandalwood oil, 5 minims three times a day, after eating and increase 5 minims daily until 15 minims three times a day, after eating; then decrease 5 minims daily. Irrigation twice daily (at 5 feet, patient standing) with potassium permanganate 1:8,000 at 105 to 115 F. The irrigation not to be "through," *i. e.*, into the bladder, until the patient can relax without the *slightest discomfort.* Hand injections to be used while infection remains anterior.

During Second Two Weeks: Bland diet continued. Patient should be up all day, and doing from two to four hours of light work. Two-glass test and smear as before. Do not repeat sandalwood oil course if improvement is marked as it should be. Irrigation twice daily, as before, with potassium permanganate solution, 1:6,000 at 6 feet, or injections if infection is still anterior.

During Third Two Weeks: Diet bland, but increased. Patient should be having from three to six hours daily of light work. Two-glass test and smear as before. If any discharge or cloudiness of urine is present, potassium permanganate, 1:4,000, irrigation.

When free from symptoms (no discharge and clear urine) for two weeks without treatment, and doing from

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(8) Jour. Amer. Med. Ass'n., April 26, 1919.

three to six hour's work daily, the patient in most cases may be considered fit for duty and infection-free.

DYES.

Flavine in the Treatment of Acute Septic Stomatitis. The use of flavin in comminuted compound fractures of the jaws as well as in acute stomatitis is reported favorably by H. W. Turner.[9]

In the latter condition, the following method of preliminary treatment has yielded excellent and rapid results. The mouth is syringed out with flavine 1:1000, special attention being paid to all pockets. Then gauze soaked with flavine solution is lightly packed into the angle of the cheek and all round the gums, and is retained in the mouth for from 20 to 30 minutes. This procedure is repeated thrice daily.

Not merely is the application painless, but it leads quickly to relief of pain and to subsidence of the acute inflammatory condition. Further, in several cases in which the mouth was so foul that one could readily detect the bad odor at a distance of several yards, 24 hours after commencing treatment with flavine, the breath has become quite free from smell.

ARSPHENAMIN.

Cause of Early Death from Arsphenamin. D. E. Jackson and M. I. Smith[1] undertook an investigation upon animals to determine the cause of early death from arsphenamin. They arrived at the following conclusions:

The slow injection of therapeutic quantities of arsphenamin in very dilute, alkaline solution (monosodium salt) produces no striking results in anesthetized dogs. As the rate of injection and the concentration of the drug are increased, toxic symptoms soon begin to mani-

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(1) Lancet, Aug. 2, 1919.
(2) Jour. Pharm. and Exp. Therap., November, 1918.

fest themselves. The earliest of these symptoms consist in a dilatation of the heart, perhaps mainly of the right side at first, a progressively increasing pulmonary blood-pressure, and a slow, gradual, but not severe, fall of the systemic pressure.

The cause of this rise in pulmonary arterial tension the authors believe to be due partly to the alkalinity of the solutions of arsphenamin used, and partly to the specific action of the drug itself. While the authors have not so far been able to prove that the formation of emboli in the pulmonary arterioles and capillaries may not be in part responsible for the increased pulmonary arterial tension, still they believe that no such action as this occurs. With large toxic doses the right heart may have to contract against a pulmonary pressure increased by 100 per cent. above the normal, while at the same time the left ventricle may be contracting against a systemic pressure reduced by 25 to 50 per cent. below the normal. These peculiar conditions may tend to establish a state of increased irritability and instability in the heart, and in rare instances delirium cordis may result. Drugs of the epinephrine type might tend to increase the instability of the heart under these conditions.

The reactions of the internal organs when arsphenamin is injected are variable, and the reasons therefor are obscure. Apparently both central and peripheral influences are concerned. As a rule, the authors have found oncometric tracings of the spleen and intestinal loop to show a dilatation, while the kidney usually contracts, sometimes in a most vigorous fashion. The toxicity of arsphenamin is not increased by the breathing of high concentrations of carbon dioxide, nor by the injection of calcium hydrate, calcium lactate, or of monosodium phosphate.

Jackson and Smith suggest that in those cases in which severe, acute, toxic symptoms suddenly manifest themselves, either during or shortly after the intravenous injection of arsphenamin, tyramine is more likely to be of benefit to the patient than is any other drug with which they are acquainted.

The Cause of Nitritoid Crises After Arsphenamin Injections. Louis Berman[3] makes a contribution to the cause of that type of clinical picture occurring during or immediately after an intravenous arsphenamin injection, the chief symptoms of which are redness of the face, dyspnea, a feeling of anguish and distress, cough and precordial pain. Wechselmann theorized that it was caused by water contaminated by dead bacteria, moulds or dissolved protein used in dissolving the arsphenamin.

After more comprehensive study, Iwaschenzow in 1912 concluded that the symptoms were definitely not caused by protein or organic substances in the water used, but depended on a sensitized condition of the patient. Millian (1912) gave to the complex of symptoms under discussion the name of nitritoid crises, because of their similarity to those of amyl nitrite poisoning and obtained with epinephrine treatment good prophylactic and therapeutic results.

Of the theories to explain the nitritoid crises two stand out most preminently: one is the sensitization of the patient to arsphenamin, in the anaphylactic sense; second is the acidity and concentration of the solution and its physicochemical effect on the blood.

A number of observers have shown that the severity of the reaction varied directly with the acidity. Thus, in Meissner's experiments on animals, it was found that if the arsphenamin was alkaline 400 mg. per kilogram could be given with impunity. On the other hand, 5 mg. per kilogram of a 0.5 per cent. acid solution caused dyspnea and often death. Necropsy showed all the organs normal except the lungs, which showed a thrombosis of the blood-vessels and an inflammatory exudate in the parenchyma. He also obtained a precipitate *in vitro* with acid arsphenamin and serum, and thought the thrombosis due to precipitates in the pulmonary capillaries. MacKee proved that the weight of the precipitate *in vitro* varied directly as the acidity and concentration.

Auer demonstrated that the toxicity was inversely

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(3) Archiv. Int. Med., August, 1918.

proportional to the acidity and concentration. This law must be considered in any explanation of the nitritoid crisis.

The problem that remained was: why, after the use of thoroughly alkalinized arsphenamin, did a few patients still continue to react? In them, it occurred generally after one injection had previously been given, and, having once happened, could be predicted to recur. The problem of the mechanism of these reactions the writer set himself to solve. He found that when properly alkalinized arsphenamin was brought into contact with serums from the non-reacting, it produced no, or a little, opalescent precipitate. Those from the reacting, however, caused a heavy whitish yellow precipitate. Thus, by testing previously the serum and the solution, one could say whether or not a reaction would follow the injection. In those in whom a precipitate was produced, a prophylactic dose of epinephrine seemed to prevent the onset of the nitritoid crisis. After its appearance, also, the same drug hypodermically shortened the duration of the alarming symptoms.

Blood from two patients showed an increased protein content. Hence, the author puts forward the hypothesis that the increased protein content of the blood in certain syphilitics may favor precipitation *in vivo,* even of properly alkalinized arsphenamin.

[Should this work be generally confirmed, a preliminary test of the patient's serum with the arsphenamin solution to be employed, to discover tendency to precipitate formation, would constitute an important part of the technique of arsphenamin treatment.—Ed.]

Reactions Following the Administration of Arsphenamin. An analysis of reactions in a series of twenty-five thousand injections is presented by William H. Guy.[4]

Just what constitutes a correct technique varies widely in the opinion of equally eminent authorities; but certain essential principles have been established as the result of clinical observation and animal experimenta-

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(4) Jour. Amer. Med. Ass'n., Sept. 20, 1919.

tion, and these were observed in the administrations. Thus, most clinicians report fewer reactions when using dilute solutions. Just what dilution is best is an open question, but most agree that reactions are more frequent when using a concentration greater than 0.1 gm. to 15 ml. Since oxidation products of arsphenamin are quite toxic, it is wise to inspect each ampoule for possible air leaks, and to use the solution as soon after it is prepared as possible. Incomplete neutralization of arsphenamin has probably accounted for more avoidable reactions than any other one factor. The author states that acid solutions of arsphenamin are from 50 to 60 per cent. more toxic than the alkaline. To prevent undissolved particles from entering the circulation, the solution should always be filtered before it is used. As different brands of arsphenamin vary considerably in toxicity, it is of interest to note that of the 25,000 injections, about 15,000 were of the arsenobenzol brand and about 10,000 were of the salvarsan brand. The arsenobenzol brand seems to have made the better record of the two preparations. But with the best technique and with a drug that is comparatively non-toxic, reactions will be encountered that have their origin in the patient himself. Guy's experience is in support of the theory (Bermans) that some reactions are due at least in part to the destruction of enormous numbers of spirochetes, liberating the protein of their bodies into the bloodstream with the production of reaction of anaphylactic type. Patients with elevated temperatures or with demonstrable pathology of almost any kind do not tolerate arsphenamin well.

The following technique was used:

"The usual preparation of the patient is ordered.

"A general physical examination precedes the beginning of treatment, and a urinalysis is made before the injection of either arsphenamin or mercury as a routine measure.

"Instruments, glassware, etc., are sterilized by boiling.

"Ampoules are floated in alcohol to detect those not intact.

"Ampoules are opened and the drug dissolved in sterile distilled water, hot water being used only with the arsenobenzol brand.

"The solution is neutralized with 15 per cent. sodium hydroxide to complete precipitation and clearing, after which a few drops in excess are added.

"The solution is filtered and then diluted by running sterile distilled water through the filter until each 0.1 gm. of the drug is contained in 20 c.c. of fluid, the temperature of the solution being approximately that of the blood-stream. Finally the solution is tested with litmus for alkalinity.

"The solution is then placed in graduated glass cylinders hung about 3 feet above the level of the table, and supplied with tubing leading to a needle connection.

"With the patient reclining, the bend of the elbows is cleansed with alcohol or painted with iodine, a small piece of gauze being placed just below the site selected for the injection. An assistant grasps the patient's arm just above the elbow, the patient closing his fist to distend the veins.

"The check valve on the tubing is released, the operator pinching off the flow of the solution with the thumb and index finger of the left hand. The needle is held in the right hand, being introduced first through the skin and then into the vein.

"On obtaining a flow of blood on the gauze, the assistant releases the arm, the patient opens his fist, and connection is made with the solution. Dosage is estimated at the rate of 0.1 gm. to each 30 pounds of body weight, and the requisite amount of the standard solution allowed to flow into the vein. The tubing is then disconnected from the needle, which is withdrawn after allowing a few drops of blood to wash it out, and a gauze compression is made over the site of the injection until all bleeding has stopped.

"Following the injection, patients rest in the ward for an hour and a half, after which they are returned to their organizations, excepting those patients with infectious lesions who are kept in the hospital until all lesions have healed."

Among reactions due to technical errors, may be counted vomiting in those with insufficient preparation. Of 150 patients who were injected, without preparation in special instances, as in early primary lesions, eight vomited within an hour after receiving a full therapeutic dose of the drug. The others in the series of primary lesions (dark field positive), numbering 350 all told, were given the usual preparation the night before and four of them were nauseated and emptied their stomachs.

Cold solutions are counted for three successive reactions with a moderate chill. On one occasion, the still being out of order, Guy used tap water, and five of forty men injected complained of shortness of breath, were flushed, and after a period varying from fifteen minutes to an hour, vomited and complained of intestinal cramps. Three cases of rather severe thrombophlebitis were seen that may have been due to local implantation of infection; or, more likely, to an infiltration of the drug between the coats of the vessel. The inflammatory process was an ascending one beginning at the site of injection and extending up the arm. These patients complained of pain and tenderness along the course of the swollen, inflamed and thrombosed vein, accompanied by an aggravated aching pain located rather vaguely at the shoulder. Cold applications and splinting gave the most relief in these cases.

On one occasion, when a new lot of salvarsan (Metz) was used, thirty-five severe reactions developed in thirty-five patients injected. On investigation it was proved conclusively that the cause of these reactions lay in faulty technique rather than in the drug itself. The one source of trouble seems to have been in the water; that used was some of the first from a new still, and had stood in the new tank for about four hours before being used. Just why this water gave such a serious lot of reactions the author is not prepared to state, unless they were due to bacterial or chemical contamination, the result of standing in the new metal tank.

Vasomotor reactions with flushing of the face, dyspnea, cough, and precordial pain were seen in but 120 isolated instances, and in nearly all of these, with recourse to epinephrine and a few minutes' wait, the injection was finished without further trouble.

A generalized urticarial eruption developed in two cases. In one of these, a mild generalized dermatitis developed after eight weekly injections, persisted for three weeks, and then the patient made an uneventful recovery. In the other patient, a generalized pruritus developed an hour after the administration of a single therapeutic dose, and persisted for ten hours. A chill, followed by fever and vomiting and diarrhea, was noted in twenty isolated instances.

Of particular interest is a group of about forty cases in which reactions developed that could be shown to be due to an aggravation of a non-syphilitic pathologic condition. For instance, several men who had a few bronchial râles at the preliminary examination, developed a moderate chill, cough, and a rather severe aggravation of their mild bronchitis. More patients with evident mild chronic interstitial nephritis tolerated the drug well. Contrary to what was expected, no unfavorable results were noted in five proved cases of pulmonary tuberculosis. In another case of the same kind, arsphenamin could not be given, because with each injection there was an exacerbation of the pulmonary symptoms. Men with elevated temperatures, except those due to the syphilitic infection itself, did not tolerate the drug well. In two cases with early reactions, a drug idiosyncrasy seemed to exist. About three hours after receiving arsphenamin, patients developed a chill, vomited, and were quite prostrated. Heart action became weak and irregular. Symptoms persisted from forty-eight to seventy-two hours, even with comparatively small doses of the drug. Epinephrine did not seem to be of any use. Finally, a mild dermatitis appeared on the forearms. Of delayed reactions the author has seen six examples. The third or fourth day after injection, they developed a train of symptoms differing but little from those seen earlier.

Of Herxheimer reactions, Guy has seen only a few. It is his opinion that Herxheimer reactions are the results of the stimulating activity of non-sterilizing doses of arsphenamin and that they may be avoided by full therapeutic dosage.

There have been two fatalities that might be ascribed in any way to antisyphilitic treatment in this series. In one case, after two 0.4 gm. injections four days apart, the patient developed an acute dilatation of the stomach, death occurring on the ninth day. The other case was that of a soldier much overweight, but otherwise, so far as it was possible to determine, quite normal. He received two injections of 0.06 each of mercuric salicylate. On the third day following his last injection of arsphenamin, he was given 0.06 gm. grain of mercury, and the next morning was found unconscious in bed. A catheterized specimen of urine showing almost a solid coagulum of albumin, was laden with blood and granular casts. The man died the same day, and at necropsy an acute diffuse hemorrhagic nephritis was found. This points to the necessity of routine examination of urine before each injection of either arsphenamin or mercury.

Atropine and Induced Anti-Anaphylaxis as a Protection against Acute Arsphenamin Reactions. J. H. Stokes[5] suggests these two measures for the control of acute reactions due to the administration of arsphenamin, in addition to those heretofore accepted, such as special care in the preparation of the patient (catharsis and empty stomach), caution in the alkalinization of arsphenamin solutions, and to the use of the epinephrine solution (suggested by Milan) in from 5 to 10 minim doses as a means of controlling the reaction after it develops and also as a prophylactic. His objection to epinephrine is that this drug administers a shock of no mean intensity by its powerful effect on the vascular system, so that patients have for the moment seemed in as much risk of serious damage from the treatment as from the original arsphenamin reaction.

Stokes supports the belief of Danysz and of Berman that the nitritoid crisis is a form of anaphylactic shock due to formation of a precipitate in the blood-stream when acid of imperfectly alkalinized arsphenamin is em-

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(5) Jour. Amer. Med. Ass'n., Jan. 25, 1919.

ployed. Berman differs from Danysz, in believing that this precipitation involves the proteins of the serum, while the latter believes it is the arsphenamin base that is precipitated.

[Berman's theory is discussed on pages 46-47.—Ed.]

The proposal of Schamberg and his collaborators that there is a factor in the preparation of arsphenamin, an impurity of as yet unknown constitution, present in the drug, is not at all incompatible with an allergic explanation of the reaction. It is conceivable that it is not the arsphenamin base alone which precipitates, but the precipitation of serum proteins may be accomplished with especial ease even in comparatively normal persons by a substance present as an impurity in the drug. No other satisfactory explanation can be found for the extreme frequency of reaction to certain brands of the drug, and its extreme rarity under identical technical conditions in others. Thus in the author's own service, in which the operators and the technique of operation remain unchanged for months and even years at a time, there can be no other satisfactory explanation for the fact that during 5,000 injections in which German preparations were used there were considerable periods when scarcely a day passed without a nitritoid crisis, while in 7,000 subsequent injections in which arsenobenzol-Policlinic and novarsenobenzol-Billon have been employed, the nitritoid crisis has become so rare that he has been all but compelled to abandon the work necessary to confirm the results presented in this paper. There can be little doubt in the minds of large users of arsphenamin that there is a factor of toxicity and a tendency to the production of anaphylactic response in certain preparations which can not be explained in absolutely general terms, and this is probably the presence of specific impurities.

The author has resorted a number of times to the induction of anti-anaphylaxis as a protection against acute arsphenamin reaction, notably in the treatment of patients with tuberculosis, who show an idiosyncrasy in about 50 per cent. of the cases. Small preliminary injections "vaccinate" the susceptible patient, so to speak, against the larger doses.

Thus a patient who received 0.05 gm. of neo-arsphenamin in 0.5 ml. of water, intravenously, one hour previously, tolerated 0.55 gm. of neo-arsphenamin intravenously in concentrated solution with the complete inhibition of all reaction usual for this patient.

If a nitritoid crisis sets in and the injection is stopped, it can sometimes be resumed again in ten minutes without further ill effect.

The nitritoid crisis can apparently be inhibited by a previous injection of atropine (0.0012 gm.) which further suggests that the reaction is a form of anaphylactic shock. Less than this dose failed to protect the patient.

Preparation of Solutions of Arsphenamin for Intravenous Use. Herman Goodman[6] states that the preparation of arsphenamin or its equivalent begins with the cleansing of the glassware. The necessary cylinders, gravity tubes, and funnels are washed twice with soap solution, using a long-handled brush. They are then rinsed in running tap water, and again in distilled water. After drying, the glassware is baked in a sterilizer at 160° C. for thirty minutes. Wet sterilization is less desirable. Distilled water should be used to boil the glassware, otherwise a film of deposited salts and dirt is evident. Rubber tubing, if new, should be boiled several times with at least three changes of water to remove the powder both within and without. Tubing once used should be rinsed thoroughly before boiling.

The water used for arsphenamin solutions is freshly distilled and not more than six hours old. Although the modern stills deliver sterile water, all water should be boiled for seven minutes.

The sodium hydroxide is a 15 per cent. solution prepared with freshly distilled water.

The arsphenamin ampoules are taken from their wrappers and put into a dish of alcohol. No tube that does not float is used. The tubes are dried with sterile gauze, as is the alcohol-sterilized file, before the tubes are opened.

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(6) New York Med. Jour., June 15, 1918.

When using salvarsan, neosalvarsan, diarsenol, neodiarsenol, or novarsenobenzol (Billon), the ampoule is readily opened by scratching the neck with the file and smartly tapping the far end. This method is not desirable with ampoules of arsenobenzol of Schamberg because the powder of this arsenobenzol has great cohesiveness and comes from the narrow neck with comparative difficulty. "Open Schamberg's tubes down on the body of the ampoule (Fig. 4), and the powder drops out easily. If it falls to the bottom of the cylinder as one mass, it is wise

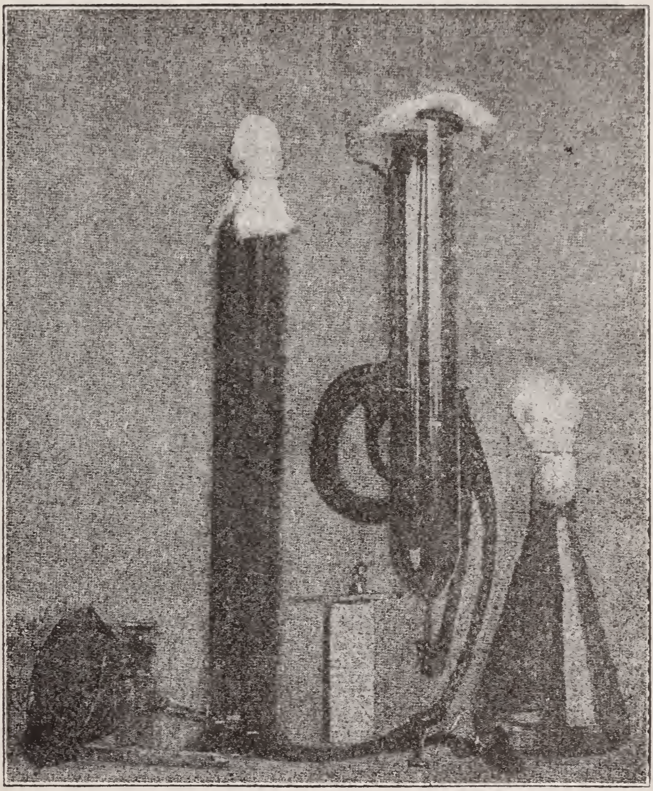

Fig. 4. Apparatus for the intravenous injection of arsenobenzol by the gravity method. Note site of filing is below the constricted neck of the ampoule.

to shake the cylinder from side to side and break up the lump.''

Water is now added to the powder, using approximately 5 mils. to the decigram. For ease in bringing on solution of Philadelphia arsenobenzol, this water should be bubbling, boiling hot. Shaking for a minute is all that is necessary to bring about solutions of all products except Schamberg's. His arsenobenzol requires vigorous shaking for at least five minutes. One should always release the stopper from the cylinder for a moment after shaking to permit the heated air and liberated gas to get out, otherwise they are likely to force the stopper out and literally shoot some of the solution along.

Sodium hydroxide solution is now added to solutions of salvarsan, diarsenol, or arsenobenzol; and the gradual drop by drop method is delayed until the neutral point is almost reached. Shake after each addition of alkali and determine this by the speed with which the precipitate is formed. The slower the alkali is added, the more precipitate is formed. On further addition of the hydroxide solution, the precipitate dissolves. The cylinders should be shaken slowly and a slight pause made before further alkali is added as this feature is noted. Often the drop of sodium hydroxide that was thought necessary is discarded after this precaution. The final neutral solution is absolutely clear. If the first solution is not complete and alkali is added, there will always be undissolved particles in the cylinder even when the neutral point has been reached.

Ordinarily use for injection 20 ml. of fluids to the decigram. At one time, this second dilution was done with saline, but now sterile water is used without ill effect.

For the injection proper, take a single gravity tube of 250 ml., nozzle tip at the bottom, and rubber tubing about five feet long. A window of glass tubing may be inserted. At the end of the rubber tubing is a male connection which fits the slip-on hilt of the Fordyce needles. The entire apparatus is suspended with its outlet tip about two feet above the level of the vein into which the needle is to be introduced. Water is first run through the gravity tube to displace all the air, and create a complete water system from a visible level in it to the end of the tubing. A pinch cock clamp on the rubber tubing holds well enough, and does less damage to the rubber than does an artery clamp. The solutions are always filtered through wet gauze from the mixing cylinder to the gravity tube. If dry gauze is used, it is very possible for a few loose ravelings from its under surface to be washed into the filtrate. The solution should not vary very much either above or below blood heat. It is not necessary to use a thermometer, judging the warmth of the cylinder with the hand suffices.

Skill in getting into veins with needles comes only with practice. The uninitiated should first take a number of bloods for Wassermanns before attempting these injections. This training will avoid some painful experiences.

No patient receives an injection whose bowels have not been emptied by a cathartic taken the night before. Omitting the meal previous to the time of injection is also of value, and in many cases it is wise to caution the patient against eating within several hours after.

It is best in all cases, except in primary lues, where the abortive cure is attempted, to precede the intravenous injections of arsphenamin by one or two intramuscular injections of mercury. This procedure reduces the possibility of the Herxheimer reaction, which is the intensification of the response of the body to the presence of the *Spirochaeta pallida.* Skin and mucous membrane lesions appear brighter, and the pains and aches of specific origin become more marked.

Patients with lesions of the central nervous system and with specific disease of the vascular system do best on small, oft repeated doses than the small number of doses of 5 decigrams, for instance. Patients with one kidney, or with impaired renal organs, may be given doses not greater than 3 decigrams with safety.

Concentrated Solution in Administration of Arsphenamin. Approximately 2,000 injections by the syringe and in concentrated solutions have been given by A.

Nelken.[7] The routine practice is to dissolve 0.6 gm. of the drug in 20 ml. of freshly distilled water. The average dose given to an adult man of normal weight is 0.5 gm. and to a woman 0.4 gm. In fresh infections, especially before the onset of a positive Wassermann test, Nelken commonly gives 0.6 gm. to a man and 0.5 to a woman, repeating this dose weekly for three doses, and then given at least two more injections at longer intervals, with mercury and iodides in some form between and following the later injections.

Hundreds of times he has injected 0.6 gm. arsphenamin in 20 ml. of water in from twenty to thirty seconds without the slightest unpleasant results, either immediate or delayed. The slowness of the injection, on which so much stress is laid, may be of importance when a large quantity of fluid is being introduced, but when the quantity is as small as 20 ml., rapidity of injection is not significant. The so-called ''nitritoid crises'' are unusual when the syringe method is employed. Since using this method, the author has seen less of other complications. He has had no fatalities, only one case of severe nephritis, the patient being now entirely well, one case of jaundice and four cases of toxic dermatitis preceded by hyperpyrexia.

Nelken uses arsphenamin put out by the Dermatological Laboratory of the Philadelphia Polyclinic.

The author concludes that success in the administration of arsphenamin depends chiefly on the following points: First, the selection of a reliable preparation; second, the use of freshly distilled, boiled water, both for dissolving the arsphenamin and for the sodium hydroxide solution; third, care in selecting the patient and adjusting dosage and frequency of repetition.

Apparatus for Administering Arsphenamin at Temperature of Blood. S. R. Thompson[8] believes that ''chills and fever'' following intravenous injections of arsphenamin are due to injecting the solution below the normal temperature of the blood. He discovered that

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(7) Jour. Amer. Med. Ass'n., June 7, 1919.
(8) Ibid., Nov. 16, 1918.

the patients receiving the injection at the temperature of blood had no reaction or chill.

The apparatus he uses consists of a glass container practically closed with a wooden cover to prevent the entrance of cold air. In the center is a regular arsphenamin graduate. In the air chamber around this there are three 10-watt incandescent lights and a thermometer. The temperature is regulated by the number of lights used. Before the injection is begun, the solution in the rubber tube can be brought to the proper temperature by allowing it to run back into the graduate (Fig. 5).

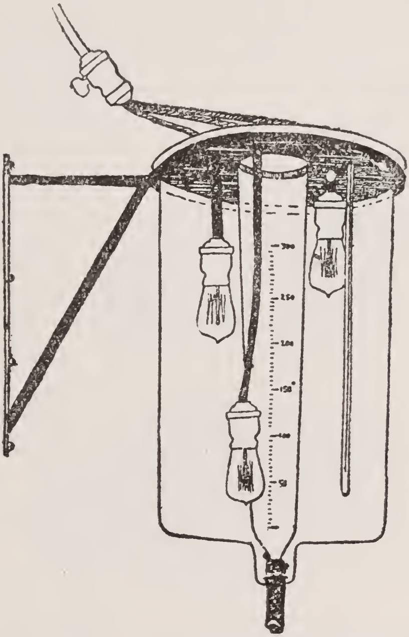

Fig. 5. Apparatus for administering arsphenamin at temperature of blood.

A Portable Arsphenamin Outfit. This apparatus is described by L. W. Harrison.[9] It is a portable outfit contained in two boxes. Figure 6 shows a "606" and saline funnel, such as is used in military hospitals, sus-

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(9) Brit. Med. Jour., Nov. 9, 1918.

pended on a frame carried on a telescopic stand, which is screwed into the hinged end of the box. The funnels are set up at home, with the straining gauze in position at the top of each and the rubber tubing attached. The stand is collapsed and the whole turned into the box, which is closed and sterilized in a steamer. At the bedside, the box is opened, and its hinged end carrying the apparatus is turned down and fixed in position by two sliding bars in the bottom of the box. The telescopic stand is then extended to its full length, and the apparatus is ready. The other box contains three Soxhlet bottles of 250 ml. capacity, fitted with Eyre's special rubber caps, which are designed to permit of sterilization without the necessity of opening and closing the bottles —one of the bottles is graduated and is used for mixing

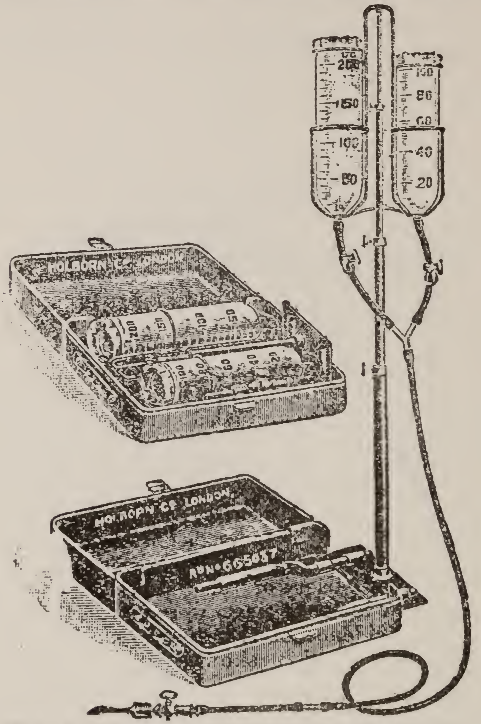

Fig. 6. A portable arsphenamin outfit.

purposes, the other two are for saline; two spare funnels; a cylinder with foot, fitted with a graduated pipette, and containing caustic soda solution; an iodine pencil, as devised by Major C. F. White, for sterilization of the puncture site; and two needles in alcohol.

In the remainder of the space are packed ampoules of arsphenamin, a small dressing, and a tourniquet. The Soxhlet bottles, funnels, and cylinders are sterilized in a steamer and thanks to special caps on the Soxhlet bottles, these can be carried quite safely in the box provided. The arsphenamin is mixed in the graduated bottle, which should contain about 50 mils. sterile distilled water, the cap being removed, the powder poured into the water, and the cap replaced for shaking. The soda is then added to alkalize, and the necessary amount of saline to bring to the required dilution, leaving enough saline for the saline funnel.

Routine Dosage of Arsphenamin and Mercury. James B. Clark[1] gives the following routine course of treatment for ordinary fresh cases of syphilis in otherwise healthy men as practiced at Camp Logan:

Each patient is carefully scrutinized for signs of stomatitis or general malaise, his weight is taken, and his urine tested before each injection, as the treatment is to be interrupted in the event dermatitis, jaundice, or other signs of intolerance supervene.

The scheme of arsphenamin dosage is based on 150-pound men: 1 decigram to about 30 pounds of body weight.

	Arsphenamin. (Intravenously) Gm.	Mercuric salicylate 33 per cent. in olive oil. (Intramuscularly) Gm.
First day	0.3	0.06
Sixth day	0.4	0.06
Eleventh day	0.4	0.06
Eighteenth day	0.6	0.06
Twenty-fifth day	0.6	0.06
Thirty-second day	0.6	0.06
Thirty-ninth day	...	0.06
Forty-sixth day	...	0.09
Fifty-third day	...	0.09

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(1) Jour. Amer. Med. Ass'n., April 26, 1919.

This is followed by one month's rest, then a Wassermann test is taken; if positive, the entire course is repeated; if negative, the mercury alone is repeated.

At the end of the second course, a rest of two months is allowed; then a Wassermann taken, and a third course given in accordance with the rule for the second course.

During the second year, if the Wassermann reaction is positive, the course is repeated as above. If negative, two mercury courses are given with four months between.

MERCURY.

Benzoate of Mercury Solution for Injection. M. E. Léger[2] considers benzoate of mercury one of the useful mercurial compounds. This salt, which is nearly insoluble in water, can be brought into solution by the addition of certain neutral salts, among them sodium chloride. Aqueous solutions of benzoate of mercury by means of sodium chloride have been advocated and used by several authors. It is necessary to note that if these injections are made with an insufficient quantity of sodium chloride they are painful, perhaps because they contain bichloride of mercury which coagulates albumin. It has been shown that if one adds an excess of sodium chloride to bichloride of mercury such solution becomes perfectly painless on injection. Léger recommends a solution of the following composition:

	gm. or c.c.
Mercuric bichloride	0.60
Sodium chloride	2.25
Sodium benzonate	0.70
Distilled water, to make	100.00

In this solution, the irritant action of bichloride of mercury disappears under the influence of sodium chloride. In such a solution, a certain amount of hydrochloric acid is liberated. To remove this, the sodium benzoate is added, which causes the liberation of an equivalent amount of benzoic acid which [being much less ionized—Ed.] is less harmful than hydrochloride acid. Chemically, this solution is identical with the older

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(2) Bull. de l'acad. de méd., April 15, 1919.

formula, in which benzoate of mercury is dissolved in sodium chloride solution; but the method of preparation given above is preferable.

Mercurophen—Sodium Oxy - Mercury - Ortho - Nitro Phenolate. This compound, elaborated by J. F. Schamberg, John A. Kolmer and George W. Raiziss[3] during a systematic investigation on the chemotherapy of mercurial compounds, was subjected to laboratory and clinical studies, on a large scale; and it was found that it possesses the following advantages over other mercurial compounds: While equal or superior in germicidal activity to mercuric chloride and other mercurial compounds containing more mercury, it is generally more rapid in its germicidal activity. Mercurophen appears to possess a special destructive affinity for cocci and spore-forming bacilli. It has proved superior to mercuric chloride in the disinfection of urine, feces, sputum, pus, catheters, instruments, rubbers gloves and the skin. Mercurophen maintains a higher degree of germicidal activity in blood serum than mercuric chloride. It does not precipitate protein in as high concentration as 1:100; nor does it irritate the skin or tarnish surgical instruments. Mercurophen is somewhat more trypanocidal than mercuric chloride and is capable of temporarily raising the bactericidal action of the blood after intravenous administration. In terms of mercury, mercurophen is less toxic for animals than other soluble mercurial compounds and this constitutes a fact of much importance in the chemotherapy of compounds of this class.

Mercurophen is remarkably free from irritant effects, and it may be used in contact with the skin and mucous membranes in dilutions as high as 1:1,000 without apparent harm.

It is a brick red powder, freely soluble in hot water. Solutions may be prepared as concentrated as 1:100. The solutions are deep amber in color, which is distinctive in dilutions as high as 1:10,000 or more. The powder and its silutions are odorless; solutions of 1:1,000 have a slightly bitter metallic taste; while higher dilutions, as 1:5,000 and 1:10,000, are practically tasteless.

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(3) Jour. Infec. Dis., June, 1919.

QUININE.

A Comparative Study of Various Methods of Quinine Administration Undertaken by the British War Office. This investigation, an abstract of 2,460 cases, is reported by Sir Ronald Ross,[3] who was able to do this by reason of the fact that early in 1917 the War Office had ordered the concentration of malaria cases in England at a number of special centers, partly that these patients might receive treatment by specially qualified medical officers, and partly in order to enable a comparison to be made between various lines of treatment. The majority were cases of benign tertian.

The following summary is presented:

From the results of treating 1,040 old cases of malaria with anti-relapse quinine prophylaxis, it would appear that comparatively small doses, amounting to about 4.0 gm. a week, distributed in various ways, reduce relapses to about 10 per cent. of the cases monthly, and also diminish the severity of the relapses when they do occur. But 0.30 gm. daily seems less effective, and 1 gm. daily is no more effective than 0.60 gm. daily and less well borne by the patients.

Sterilizing treatments, given in 1,420 cases, illustrate the difficulty of sterilizing cases entirely, but also seem to show that success in this tends to vary directly with the magnitude of the daily dosage. No permanent bad effects with large dosage have been reported.

The author can not say that he has been able to note any marked superiority in any one of the three modes of administration of quinine—oral, intramuscular or intravenous—as regards either the speedy reduction of the fever and the parasites (in relapses) or as regards complete sterilization of cases. The method of using oral and intramuscular administration together is valuable when large doses are employed, which is, after all, probably somewhat more successful than any of the other forms tried. With the present information, the following treatment seems to be the best for resolving infections:

Quinine bihydrochloride by intramuscular injection, 1

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(3) Indian Med. Gaz., July, 1918.

gm., simultaneously in each deltoid, with 0.60 gm. orally, of hydrochloride thrice daily, totalling 4.0 gm. daily, for twelve days—patient remaining in bed for this period.

Old cases generally do so well under anti-relapse treatment that it is a question whether efforts to establish early and absolute cure in them by the sterlization methods tried are always very much worth while, especially as numerous patients under anti-relapse treatment seem to recover by themselves, either completely or sufficiently to be able to return to light or full duty.

The Principles of Quinine Prophylaxis. Sir L. Rogers[4] ascribes the reported failures of quinine prophylaxis to inadequacy of the methods used in the particular cases. Much of the confusion and disappointment regarding quinine prophylaxis appears to be due to the principles on which it should be based being neglected or ignored. A most important point which is often overlooked is that in places with a very high endemic index, such as 80 to 100 per cent., the population is already so almost universally infected with malaria that prophylaxis is out of the question, and the comparatively small and infrequent doses given for that purpose can not possibly be expected to cure the infected persons to whom it is administered; or to prevent the inevitable recurrences of the disease in insufficiently treated malarial infections. What is wanted in such cases is to give three weeks' treatment with full curative doses of quinine once a quarter.

The second principle is that to be effective prophylactically, quinine should be given at least the full period which each form of parasite takes to develop before the end of the incubation period.

The accompanying table gives the data for the various types:

THE INCUBATION PERIODS OF MALARIAL FEVERS.

Variety.	Max.	Min.	Mean.	Days between doses of quinine.
Quartan	18	11	14	11
Benign Tertian	21	6	11	8
Malignant Tertian	14	2	6	2

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(4) Indian Med. Gaz., July, 1918.

When malignant tertian malaria is very prevalent, as a double infection is commonly present, the quinine should be given on two consecutive days to catch each brood at the stage when they are most susceptible to the drug.

The third important and most essential factor in obtaining success is to give an adequate dose of quinine, which will kill all the young, recently inoculated parasites and not allow some to escape and produce the disease.

The two main methods in use are Koch's plan of giving a full dose of quinine on two consecutive days of each week, and the plan of giving 0.30 gm. daily.

1. Koch's method of giving 0.60 to 1.00 gm. on two consecutive days each week was once very popular and it has scored successes as well as failures. The principles laid down will suffice to show that it is especially likely to fail in highly malarious districts, where the malignant tertian variety predominates. Koch's method leaves a five-day interval between the prophylactic doses, which is too long in the case of the predominating malignant tertian infection. This method should be abandoned as being unreliable and contrary to the correct principles of quinine prophylaxis.

2. The plan of giving 0.30 gm. doses of quinin daily has been largely adopted during recent years, with somewhat contradictory results. The data obtained are clearly much more favorable to the system of small daily doses than to biweekly larger ones, the failures having been chiefly in intensely malarious parts of Africa and the Malay States, where curative rather than prophylactic doses are indicated. Nevertheless, several failures have been reported, and the question arises whether 0.30 gm. is not too small a dose to be relied on.

A sufficient dose, which it seems advisable to determine, is not less than 0.60 gm., to eliminate the danger of some of the parasites surviving and becoming resistant to quinine, which is said to be a danger if only 0.30 gm. doses are used.

The intervals without quinine between the doses should not exceed four days, except when malignant tertian malaria is present in an epidemic form, when the intervals without quinine should be reduced to two days, and the dose increased to 1 gm.

Administration of Quinine in Malaria. It is the opinion of C. C. Bass[5] that the most effectual and practical method of disinfecting malaria infected persons is to give them 0.60 gm. of quinine sulphate every night before retiring for a period of eight weeks. The author quotes the following doses for children to obtain the same result 0.60 gm. gives in adults:

Under one year	0.03 gm.
One year	0.06 gm.
Two years	0.12 gm.
Three and four years	0.18 gm.
Five to seven years	0.24 gm.
Eight to ten years	0.36 gm.
Eleven to fourteen years	0.48 gm.
Fifteen years and over	0.60 gm.

The quinine is best administered to adults in the form of tablets [capsules might be preferred, and perforating the capsule with a pin prick just before swallowing might be of advantage.—Ed.] To children, the dose is best administered in a teaspoonful of the aromatic syrup of yerba santa *(Syrupus eriodictyi aromaticus)*.

The full eight weeks' treatment should be prescribed at one time, and the patient impressed with the necessity of taking the full treatment without missing a dose; otherwise a relapse is likely to occur.

During acute attacks of malaria, 0.60 gm. doses should be given three times a day for a period of three or four days, which always relieves the acute symptoms, and then the eight weeks' treatment undertaken to eliminate the infection.

Bass believes that this treatment will disinfect more than 90 per cent. of cases. To disinfect 100 per cent. would take more than three months' treatment. In case of relapse, the full treatment must be repeated and continued longer than eight weeks. No credit can be allowed for previous treatment.

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(5) Jour. Amer. Med. Ass'n., April 26, 1919.

Administration of quinine by mouth is the only method to be considered in the treatment of malaria, except in rare incidences of pernicious malaria, when one or more doses, given intravenously, may save life. The dose for this purpose should never exceed 0.60 gm. The dihydrochloride of quinine is a good salt for this purpose. Administration by mouth should be started just as soon as practicable in such cases. Bass advises those who contemplate injecting quinine hypodermically by deep injection to take a few doses themselves, which he thinks would soon quiet their enthusiasm for the method. For oral administration quinine sulphate is as effective as any other salt. The greater solubility of some other salts is of no advantage in the treatment of malaria, but on the contrary may be a disadvantage.

The use of 0.60 gm. of quinine sulphate by mouth for the sterilization of the blood of malaria carriers is also advised by J. C. Geiger, W. C. Purdy and R. T. Tarbett[6] who believe that a thirty days' period of treatment is sufficient for a season.

[It will be noted that all these authorities agree on 0.60 gm. as the best dosage for quinine.—Ed.]

Colloidal Quinine in Treatment of Malaria. F. Roux[7] reports favorable results with the intravenous injection of colloidal quinine (base) in doses of 2.5 to 5 mg. in old cases of malaria with enlargement of the liver and spleen which had resisted other quinine medication. He usually gives an injection daily or every second day; and he has never had to administer more than four doses. The injection is generally followed by a reaction of varying symptomatology, such as chill, fever, vomiting, headache and profound sleep. He has never observed serious results. Roux believes that this method of administration of quinine is superior to any of the classical methods, especially in the presence of hemoglobinuria.

Quinine as Pneumococcide Mouth Wash. S. Solis Cohen and Edward Steinfield[8] have tested a number of quinine solutions in different flavoring vehicles with the

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(6) Jour. Amer. Med. Ass'n., March 22, 1919.
(7) Presse méd., June 27, 1918.
(8) Jour. Amer. Pharm. Ass'n., May, 1919.

purpose of determining palatability and germicidal activity against pneumococci.

These solutions have all been found capable of destroying pneumococci of Types I and II *in vitro.* Those containing acacia have been less efficacious than others. On the other hand, neither glycerine, syrup nor honey seems to interfere materially with the action of the germicide.

A solution containing quinine and urea hydrochloride and phenol, each in a dilution of 1:200, made up with 20 per cent. of glycerine and flavored with oil of peppermint, is fairly palatable. This was tested against Type III pneumococci also and found effective. It exhibits, likewise, penetrative ability in sputum.

The following formula is therefore recommended:

Quinine and urea hydrochloride	0.5
Phenol	0.5
Glycerine	20.0
Oil of peppermint	2 drops
Water, to make	100.0

The solution mentioned may readily be associated with the compound guaiac gargle, which has been found so effective against tonsillitis and other throat infections, and which of itself shows considerable germicidal activity against pneumococci. To do this one simply substitutes compound gargle of guaiac (N. F.) for the water of the formula.

Infusion of coca may be substituted for water in all the formulas with advantage as to palatability; but, owing to the tannin it contains, it precipitates some of the quinine. This may perhaps lessen slightly the germicidal activity, but even insoluble quinine tannate in small proportions will inhibit the growth of pneumococci in test-tube cultures.

IPECAC AND EMETINE.

Comparative Value of Ipecac and Its Alkaloids in Treatment of Intestinal Endamebiasis. Sidney K. Simon[9] considers ipecac superior to its alkaloids. While

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(9) Jour. Amer. Med. Ass'n., Dec. 21, 1918.

no question can be raised of the prompt amebicidal action of the emetine on the free living or vegetative organisms, more extended opportunity for observation has made it increasingly clear that, in the matter of the destruction of the endamebic cysts, the alkaloidal therapy in many instances meets with marked failures, thereby opening the way for repeated recurrences of the infection.

A close analogy exists, in fact, between the *Endameba histolytica* and the malarial hematozoa in the matter of their behavior to specific medication. Both organisms, in common with protozoa in general, exhibit two separate and distinct phases in their life cycle, including a free living or vegetative stage of existence which permits of free locomotion enabling the cell to obtain its nutriment, and a second state in which the vital activities of the cell are found in abeyance within the enclosure of a cyst wall (the so-called gamete). It is only in the latter state that infection is conveyed from host to host, since the vegetative organism is prone to succumb or to undergo encystment when removed from its original environment. The pathologic conditions arising in the human organism are, however, the sole result of the vital manifestations of the free living protozoon. In its encysted state the organism lies dormant, incapable of tissue harm, but offering marked resistance to external influence. Protozoa once having become encysted have acquired thereby an increased resistance to their specific drug, in sharp contrast to the ease with which the organism in its vegetative state may be reached and destroyed in the same dosage. In fact, relatively small amounts of the specific drug, instead of killing the organism outright, will often induce the obverse effect of driving it into encystment. While the immediate clinical symptoms are promptly relieved by such a process, the difficulties surrounding the complete eradication of the infection are largely increased. Just as relatively small amounts of quinine tend to encourage the formation of gametes, so, in endamebic disease, unless appreciably large doses of ipecac or of its alkaloids are employed, the free living organism seeks protection against the toxic action of the drug by enclosing itself within a cyst wall.

While the crude ipecac, in amounts as high as 5 gm. in daily doses repeated over a period of ten days, has been found singularly devoid of toxic effects, experience has shown that the alkaloids, in an equivalent dosage, possess no such immunity. They must be charged with the not infrequent occurrence of a peripheral neuritis, an intractable form of watery diarrhea, gastric hyperemia and irritability, cardiac arrhythmia and, in addition, various types of skin reaction at the site of injection of the drug.

Cephaelin has greater emetic properties and is far more irritating to the skin when given hypodermically than is emetine. Its destructive effects on the vegetative endameba is probably equally as great as that of emetin. However, the same failure in the matter of the destruction of the cysts was noted.

In connection with emetine mercuric iodide and emetine bismuthous iodide, it was hoped that their emetic effect might be reduced to a minimum. However, according to most observers, this hope has scarcely been realized. Walters and Koch[1] have carried on experimental work with synthetic derivatives of cephaelin, and found that cephaelin iso-amyl ether hydroiodide was uniformly effective in destroying both the vegetative and the encystic endameba in the intestinal tract of cats. When, however, this substance was tried on three human subjects, its action on the free living endameba proved to be equal in value to that of the simple alkaloids, but no definite effect could be noted in its action on the cysts.

In view of the evident inadequacy of the alkaloidal therapy, Simon thinks that a return to the use of the original crude ipecac root should be most seriously considered by the profession at the present time. Failure to observe the smaller details of the plan has been the cause of much of the former prejudice surrounding the administration of the crude ipecac. "First of all, it is essential that the patient be put to bed for the full course of the treatment, extending ordinarily over a

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(1) Jour. Pharm. and Exp. Therap., 1917, 10, 73.

period of ten days, and also that the dietary be restricted in the beginning to articles of food which leave no residue in the intestinal tract, such as broths, whey, albumin water and the various nutrient alcoholic preparations. To this list, milk is to be added only after the fifth or sixth day of treatment. A dose of castor oil should be administered on the morning of the first day of treatment and in the evening, around 9 o'clock, from ten to fifteen salol-coated pills should be taken, each containing 0.30 gm. of the powdered ipecac. The patient is advised to swallow these slowly with the help of moderate amounts of water. No nourishment is allowed for two hours preceding and likewise for six hours following the administration of the pills. Each succeeding night the same plan is to be repeated, the number of pills varying on each occasion from ten to fifteen. It may be found necessary, especially in the presence of any depressing effect, to discontinue the use of the pills for a one-night period. Each day the attending nurse keeps a record of the number of pills which might have passed undissolved in the stool, with the view of determining the total amount of ipecac retained at any stage of the treatment.''

The complete dosage includes the retention of at least 100 pills, equivalent to 500 grains of the powdered ipecac. This is accomplished usually within a period of ten days and only under rare conditions must it be made to extend over two weeks. Should nausea and vomiting arise as troublesome features, an extra enteric coating should be added to the pills. Under average conditions, a coating of one-tenth inch of salol is ample. Should large numbers of the pills pass through the intestinal tract in an undissolved state, making from one or two punctures into the outer layers of the pill surface, with a small sized surgical needle, will be helpful. When ipecac is not tolerated in pill form, the duodenal intubation method might be used, employing for the purpose daily installations of 2 gm. of the powdered ipecac suspended in water. With the use of the ipecac mass orally, in daily amounts as high as 5 gm. and yielding approximately 0.09 gm. of total alkaloids, a concentration of the effective properties of the drug is attained in the infected colon, without any possible danger of toxemia. It is the author's firm conviction, based on clinical observations extending now over several years, that the treatment of intestinal endamebiasis by means of the crude ipecac offers a most promising outlook for complete and permanent cure, not attainable with the use of the alkaloids alone, whether administered orally or hypodermically.

ALLEGED SPECIFICS.

INFLUENZA REMEDIES.

Cinchona Bark in Treatment of Influenza. Raphael Du Bois[2] reports excellent results from the administration of finely powdered yellow chinchona bark, given in doses of three or four heaping teaspoonfuls daily. One spoonful is given every three or four hours in a cup of strong black coffee, hot and sweetened. It is, of course, important that the drink be stirred while being taken, so that the powder be completely ingested. He states that he has often seen a cure in from twenty-four to forty-eight hours. Improvement in the general condition is usually evident after the first dose.

Creosote in Prophylaxis and Treatment of Complications of Influenza. This is recommended by L. Weiller[3] as follows:

Every twelve hours the patient is given in an enema a glass of lukewarm milk containing about 1 drop of creosote for each year of age for children, and from 25 to 30 drops for adults. The mixture should be well shaken and the enema retained for at least two hours. In cases of pulmonary complication, the dose should be increased by from 2 to 5 drops for children and from 4 to 8 drops for adults. The complication subsides rapidly. The intervals should be lengthened when the temperature becomes normal; and, two days after the cessation of pyrexia, the treatment is stopped. Al-

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(2) Bull. de l'acad. de méd., Oct. 1, 1918.
(3) Paris Letter, Jour. Amer. Med. Ass'n., Dec. 14, 1918.

buminuria, so frequent a symptom in pneumococcus infections, he does not consider a contraindication for this treatment.

Salicin in Influenza. E. B. Turner[4] advocates large doses of salicin in influenza, giving 1.3 gm. every hour. He obtained rapid recovery in an average of one day and a half without any complications, sequelae, or the loss of a single life, in over 2000 cases. The first two or three doses remove all pain and discomfort, while the temperature is materially reduced. He also believes that saturating the system with salicin does away with the infectivity of the patient. In no single case has he come across the slightest ill effects from the large doses of the drug given.

E. W. Watson[5] adds his testimony to the value of salicin given in doses of from 2 to 2.5 gm. every two or three hours, or, if the onset is at night, a heaping teaspoonful in cold water at bed-time. He considers it a real specific, as truly so as is quinine in malaria. In some cases that have developed into so-called pneumonia, its use has seemed to turn the scale to recovery.

Reginald Pollard[6] has also used salicin with good results in this disease.

[In view of the freaky nature of influenza and considering the fact that all kinds of medication, including homeopathic, as well as no medication at all, have given "excellent" results in this disease, we must be skeptical toward claims such as those abstracted above.—Ed.]

Magnesium.

Disinfectant and Antiseptic Action of Concentrated Solutions of Certain Magnesium Salts. This study was undertaken by Z. Northrup[7] because a saturated solution of Epsom salt, which has been used extensively as a substitute for talcum or face powder, by rubbing a small amount of the liquid gently all over the face until

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(4) Brit. Med. Jour., Aug. 3, 1918.
(5) Amer. Medicine, November, 1918.
(6) Brit. Med. Jour., Oct. 26, 1918.
(7) Jour. Infect. Dis., February, 1919.

dry, thus leaving a soft "bloom" on the skin, has been found also to have a salutary effect on the skin, pimples drying up and disappearing.

The procedure for the phenol coëfficient of $MgSO_4$ was caried out for *Staphylococcus aureus,* and also for *B. typhosus* with completely negative result. Even a 50 per cent. solution, which is practically saturated, did not kill the organisms. That plasmolysis from strengths of salt above saturation plays no rôle, was shown by the fact that, when heavily inoculated saturated solution of magnesium sulphate was permitted to dry at incubator temperature, growth of the organisms could still be obtained.

On the other hand, the magnesium ion was found to have a markedly inhibitory effect on the growth of streptococci, as was shown by the fact, that even 5 per cent. in broth does not permit its growth. $MgC1_2$ was the only magnesium salt used that had a marked inhibitory action upon the *Staphylococcus pyogenes.* In fact, this latter salt had the most marked inhibitory action on the growth of all organisms used in the experiment. This suggests that a substitution of $MgCl_2$ for $MgSO_4$ might be of advantage.

The author believes that further study of the specific action of concentrated solutions of $MgSO_4$ and other magnesium salts on the infected skin or in wounds may present interesting if not valuable information. In the treatment of war wounds, $MgSO_4$ was advocated by Morison and Tulloch in 1916.

Magnesium in Cancer. Shigemitsu Itami[8] treated experimental cancers in mice with intravenous injection of magnesium chloride in doses relatively eight times larger than the toxic dose for man without effect on these mouse tumours, even when two or three treatments were given within a few days.

Since carcinomas of the mouse are quite comparable to those of men, the assertion may be ventured that this element will prove to be useless in human cancer as well.

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(8) Jour. Amer. Med. Ass'n., March 29, 1919.

RESTORATIVE THERAPY.

ACIDS.

Large Doses of Hydrochloric Acid in Gastric Achylia. V. Bie[8] reports a case of gastric achylia with enteritis and anemia, for many years refractory to all treatment, which was successfully treated with hydrochloric acid in doses large enough to supply the proper proportion for normal digestion. As the stomach secretes a 4 or 5 per thousand solution of the acid, which corresponds to a dilution of the hydrochloric acid of the Pharmacopeia of about 1:50, the acid was given on an empty stomach, by means of the stomach tube, once a day, commencing with 1 ml. in 250 ml. of water, increasing gradually to 5 ml. and even 8 ml. in from 250 to 500 ml. water, and keeping up this dose at intervals for nearly three months. The hydrochloric acid was not given every day, only nine times in the first month and six times in the second month.

ADSORBENTS.

Animal Charcoal in Treatment of Chronic Disturbances of the Small Intestine and of Enterotoxicosis. Animal charcoal in doses of from one to three heaping teaspoonfuls (5 to 10 gm.) has been administered by E. Lenz[9] every evening before going to bed, that is, as long as possible after the last meal, because it has been shown by experiment upon human beings that administration of charcoal fifteen minutes before a test meal lessens total acidity and the hydrochloric acid value to a considerable extent. It is also reasonable to assume that digestive ferments would be adsorbed and digestive activity become impaired. Hence, the smallest amount that is likely to be useful should be employed and given as long as possible after or before meals. It should be stated, however, that as much as 20 gm. daily may well be administered and that in acute diarrheal disturb-

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(8) Ugeskrift f. Laeger, May 15, 1919.
(9) Cor-Bl. f. schweiz. Aertze, Oct. 12, 1918.

ances as much as 80 to 100 gm. of animal charcoal have been administered.

The author administers the dose suspended in hot water or in a cup of chamomile, linden, or valerian tea. When satisfactory results are obtained, a dose may be administered every second or third day and is in this manner gradually discontinued. If, however, exacerbations set in, there is absolutely no objection to continuing the use of charcoal indefinitely. The treatment has been continued for weeks and months. Indeed, it is upon this continuous use of this remedy that the author lays special emphasis. He considers this chronic administration an important therapeutic advance in the treatment of chronic putrefactive and fermentative dyspepsia and duodenal catarrh, in which conditions he has given the remedy usually in periods of 8 to 14 days with intervals of several days during which the charcoal administration is intermitted. This chronic intermittent administration enables the bowel to recover from local irritant action and other possible by-effects of the charcoal treatment. While so far such effects have not been demonstrated, yet it must be admitted that there is a possibility of nutritional disturbance being produced by this treatment, most especially that the charcoal might adsorb vitamines and produce an avitaminosis. There is also a possibility that digestion might be impaired by adsorption of digestive ferments, and the author, as previously stated, has occasionally noticed diarrheal and spastic manifestations on the part of the colon which he has considered due to mechanical irritation by the charcoal. This paradoxic reaction, instead of the usual constipating effect of the remedy, is diminished by utilizing the finest possible powder; but there seems to be an idiosyncrasy against charcoal in some patients. We must also bear in mind the possibility of the formation of charcoal enteroliths. The possibility of anthracosis of the intestine and of the retroperitoneal lymph glands by absorption of the coal is a possibility which must also be thought of, the occurrence or nonoccurrence of which future investigation will have to determine.

The principal indication for this treatment is found in chronic and functional disturbances of the duodenum and in chronic intestinal catarrh, gastrogenic diarrhea, fermentative and putrefactive dyspepsia and spastic constipation.

On the basis of the demonstration of a prompt diminution of urobilinuria in two cases of chronic cholangitis under charcoal therapy, the author considers the possibility of this treatment constituting prophylaxis against liver disease as not too far fetched.

Combination with saline mineral waters is especially indicated in those cases in which constipation occurs as a result of charcoal treatment, as well as when we attempt to antagonize enterotoxic liver disturbances, or general enterotoxicosis. The author employs, in such cases, four to six weeks' courses of an alkaline saline bitter water of which he has the patient take from 200 to 400 c.c. every morning.

Kaolin in Treatment of Asiatic Cholera. That the mortality of this disease can be reduced from the usual 45 per cent. to or near 2 or 3 per cent. by the use of kaolin or bolus alba (albuminum silicate) suspended in water, is the claim of V. Kuhne.[1] The finely powdered substance is administered in an equal volume of water. Thus 250 mils of kaolin which weigh about 100 gm. are mixed with 250 mils of water by pouring the kaolin into the water and not *vice versa.* A small glassful of this mixture, which resembles cream, is administered every half hour or hour. It is rarely necessary to give more than six glasses, amounting to 200 gm. of kaolin during the first twelve hours. Generally, after the administration of the first doses, vomiting ceases, the patient warms up, the pulse becomes less frequent and stronger, the cramps of the extremities disappear and the phenomena of dehydration become less marked. During the following day, the patient is given several more glasses and this terminates the cure. If the cholera is treated at the first appearance of symptoms, the patient will be well, Kuhne says, in twenty-four hours and able to leave the hospital after three days. In more severe

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(1) Rev. méd. de la Suisse romande, Sept. 20, 1918.

cases, one should count from five to six days before complete convalescence is established. Even in apparently hopeless cases, a patient has a good chance to recover, though it takes longer than ordinary cases. One should not be discouraged by vomiting after the first doses of medicament, but should make the patient repeat the dose and even have recourse to a stomach tube, because the kaolin will stop vomiting. If the patient has difficulty in swallowing, the dose may be given by the spoonful. If the stomach and intestine are atonic by reason of the paralyzing action of the cholera toxin it is well to introduce the same mixture by means of enteroclysis, using as much as three liters.

This medication dispenses with all other medicinal treatment such as alcohol, cardiac tonics or other stimulants. The following three points are of importance:

1. During the eighteen hours which follow the first dose of bolus alba, one must not give any other drink or nourishment except water.
2. The kaolin must never be administered in any other liquid than water, which preferably should be cold.
3. One must administer this earth in most liberal doses—the more, the better—for the substance is absolutely non-toxic.

This treatment might be instituted in all acute diarrheal conditions, as even in cases that are not Asiatic cholera its results are said by Kuhne to be excellent. On the other hand, this treatment is useless in diarrhea due to amebic dysentery or intestinal tuberculosis. The action of kaolin is partly physical, by reason of its tendency to envelop the microbial bodies which can not grow in this medium, and partly due to adsorption which renders toxic substances harmless.

The author calls attention to the fact that kaolin is also useful in treatment of wounds, burns, indigestion, abdominal pains, in meteorism, as an antidote to poisoning and in the treatment of pin-worm infestation.

In an infant a dose of 30 gm. kaolin in from 70 to 100 mils of water would suffice. In an older child, 60 gm. in 150 mils of water is sufficient. After three hours it is generally well to repeat the dose. For infants, it is well to sweeten the water.

[The antidotal value of kaolin in alkaloidal poisoning is practically *nil*, that of fuller's earth is slight, the degree of action varying greatly with different specimens of this substance. It would be interesting and important to determine whether highly absorbent fuller's earth would not be superior to kaolin in the treatment of cholera.—Ed.]

Lithium Aluminum Phosphate as an Intestinal Antiseptic. Joseph B. Weighart[2] thus describes this substance and its effects: It is a hard, white, brittle substance similar to porcelain, insoluble in water, and in acid or alkaline solution. Administered as fine powder or in tablets, it passes the stomach unchanged. But it is somewhat soluble in concentrated and diluted phosphoric acid and in solutions of alkaline as well as of acid phosphates. Inasmuch as these are continuously present in the intestines from the ileum down to the colon, a considerable portion of the lithium aluminum phosphate administered swells up to a gelatinous mass. From analyses made, it has been determined that the principal amount of lithium contained is execreted by the urine in from thirty-six to forty-eight hours after administration. The aluminum phosphate appears in the feces in a gelatinous condition. This circumstance proves the disintegration of lithium aluminum phosphate in the lowest part of the intestines with absorption of the lithium component leaving the aluminum phosphate or some other twin salt of aluminum phosphate within the contents of the intestines. Aluminum acetate has long been known as an antiseptic by the surgeon. Calcium phosphate keeps the feces of dogs antiseptic, rendering them white and without odor.

"Aluminum phosphate, or the new twin salts formed in the lower intestines, is a very powerful antiseptic, especially in its nascent state and in collodial condition. The bacterial life in the intestines is not entirely destroyed by it; but acid fermentation of the small intestines, as well as alkaline putrefaction in the lower colon,

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(2) Western Med. Times, May, 1919.

are controlled and kept within low physiologic limits. It may be given in diarrhea as well as in obstipation."

The author has used up to 10 grams a day and in a few cases more without any toxic effect.

[Whatever effects can be obtained from this substance are evidently due to colloidal adsorption and are analogous to those obtainable from fuller's earth or kaolin. Experiments with fuller's earth would not lead me to expect anything phenomenal in the direction of intestinal antiseptics from any one of these substances, unless it is used heroically and to the exclusion of all bacterial pabulum, as advocated by Kuhne in the treatment of cholera (pages 78-80.—Ed.]

Water Absorbing Capacity of Dusting Powders. This property of dusting powders has been tested by Torald Sollmann[3] with the following result:

Powder tested.	Weight of water held by 3 gm. of powder.	Retained water as per cent of the powder.
Starch (corn)	2.39	80
Kaolin	2.19	73
Fuller's earth	2.09	70
Precipitated calcium carbonate	1.94	65
Talcum	1.84	61
Prepared chalk	1.59	53

The table shows that the commonly used dusting powders do not differ very materially in their capacity for holding water. However, starch, kaolin and fuller's earth are more effective in this respect than chalk or talcum.

ALKALIES.

Alkali Treatment of Influenza. Thomas C. Ely[4] believes it to be an established fact that acidosis is a constant factor in all the infectious fevers, and that in the recent influenza epidemic acidosis was particularly prominent and had much to do with the extraordinary

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(3) Jour. Amer. Med. Ass'n., March 29, 1919.
(4) New York Med. Jour., April 5, 1919.

fatality. Striking clinical proof of this acidosis, he thinks, was noticed in the following ways: The peculiar acetone odor of the breath was so characteristic that some clinicians made a tentative diagnosis of influenza on this symptom alone; the symptoms of dyspnea and air hunger were severe even without other striking respiratory symptoms. The associated cyanosis is the result of the withdrawal of the alkali reserve. The therapeutic proof was most convincing. The proper administration of the three basic alkalies—sodium, potassium, and calcium—was immediately followed by the gradual cessation of acidosis symptoms and an extremely low mortality rate, which is in striking contrast to the high mortality in cases in which alkalies were neglected. In addition to the great number of influenza cases that were seen daily during the recent epidemic, Ely has treated twenty-six patients with pneumonia with well-marked crises, over 100 cases of lobular pneumonia, five pregnant women, and eleven instances of severe intestinal infection. The large number of recoveries he attributes to the persistent use of early elimination and to saturation of the system with alkaline bases, avoiding any remedies which check secretion, such as opium or belladonna, or any heart depressant, such as aspirin, or any influenza vaccine or serum. A free water supply must be essential to carry on with advantage the laws of osmosis with these bases and to favor elimination of the products of combination with the acids. Too much alkali might produce harmful alkalosis.

The technique of treatment is as follows: Immediate elimination is instituted by profuse sweating and divided doses of calomel, one-tenth grain every half hour until a grain or more has been given. Water is given freely by mouth or by bowel throughout the attack. Sweating is preferably accomplished by drinking large bowls of boneset tea. Hot lemonade with whisky was often given. Hot mustard foot baths were always used, the patient being kept in bed covered with blankets and surrounded by hot bottles. Ely administered a teaspoonful of sodium bicarbonate to a pint of luke-warm water every four hours by enema. In routine treatment he gave, by mouth, sodium bicarbonate, one-half ounce, in peppermint water four ounces [more than will dissolve; solubility of sodium bicarbonate is 1 part in 11 of water.—Ed.], a teaspoonful every two hours, alternating with potassium citrate, one-half ounce in peppermint water four ounces, teaspoonful every two hours. The calcium salts he gave in the form of lime water, one-third, milk two-thirds.

"It is surprising," he says, "how the soda in from twenty-four to forty-eight hours will relieve the early pains." In addition, he employed the common cardiac and respiratory stimulants, strychnine, caffeine, sparteine, digitalis, camphorated oil, oxygen, and aromatic spirits of ammonia. In all cases the patient was confined to bed, and the use of a bedpan was made imperative. From the first, even when no food was allowed, the patient was given orange juice and lemonade freely. The author does not believe in serum and vaccine treatment of influenza. He says, "We are all familiar with numerous re-infections, and it may be questionable whether a passive immunity can be induced for a disease which itself does not produce [a more efficient—Ed.] active immunity. Can we hope to vaccinate against a disease which does not vaccinate against itself?"

[My experience[5] agrees well with that of the author. I can not, however, believe that the explanation of the clinical facts is as simple as he suggests. That acidosis is the chief source of danger in this infection is an unproved assumption. It seems more rational to believe that alkali favors the establishment of immunity. The same thing might be said about the use of heat (see "Pyretotherapy," page 132) employed by Ely and others, under the impression that it favors elimination. The amount of poison eliminated by sweating must be very small, in view of the fact that the specific gravity of sweat is but slightly above that of distilled water. That heat, on the other hand, favors the establishment of immunity and chilling antagonizes it is an every-day observation.—Ed.]

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(5) Jour. Amer. Med. Ass'n., Nov. 23, 1918.

Sodium Citrate in Treatment of Pneumonia. W. H. Weaver[6] believes that this form of treatment has not received the recognition it deserves. Sodium citrate, he claims, increases the fluidity of the blood, its alkalinity, its antitoxic power and leukocytosis. Hence, it aids the natural forces at work in the cure of the disease.

Sodium citrate is a salt of feeble alkalinity and may be given in sufficiently large doses to produce its effect without the least danger of harm, or even discomfort to the patient. Its taste is not disagreeable, nor does it disturb the gastric functions or appetite. It might be given in doses of 4.0 gm. every two hours, if that amount were considered necessary. It may be given with a little citric acid or lemonade in small quantities. The dose for an adult Weaver has found to be 2.5 gm. every two hours. For children, the dose should be calculated from that amount. In bronchopneumonia the dosage must be larger than in the lobar type, owing to the difference in the character of the disease.

If the cathartic action of the sodium citrate appears, it should be checked and the dose maintained, rather than reduced. Until the clearing up process is completed, the citrate must be continued at the same dosage.

If there is no improvement in from six to twelve hours, the dose may be increased. In adults, improvement does not begin until the third day, or later if the dose has been inadequate.

In an adult, from 2.5 to 4 gms. every 2 to 3 hours must be continued day and night until the lung has entirely cleared. If the citrate is discontinued before complete resolution there will be an immediate relapse.

The author reports a total of thirty-six cases, in all of which the patients recovered by lysis under the administration of sodium citrate.

[Extemporaneously prepared sodium citrate, produced by giving the patient every two hours a tumblerful of lemonade with half a teaspoonful of baking soda added to it, has been a favorite treatment of many infectious diseases, including rheumatism and endocarditis, in the hands of experienced practitioners.—Ed.]

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(6) New Orleans Med. and Surg. Jour., October, 1918.

Sterilizing Bicarbonate Solutions. An editorial in the *Interstate Medical Journal*[7] calls attention to the fact that if the bicarbonate solution be heated in an atmosphere of carbon dioxide and cooled in the same condition, the resulting solution contains only the bicarbonate and not the carbonate. Therefore, if the bicarbonate solution be packed in a bottle with a spring clip stopper, such as is used for sparkling mineral waters, and charged with carbon dioxide just before closing, it may be sterilized in the autoclave at one sitting. The bottle, before opening, should be cooled, and shaken when cool. It is a wise precaution to add a few drops of phenolphthalein solution before sterilization. Should the finished solution show a pink shade it must be rejected.

ASTRINGENTS.

Knifeless Treatment of Piles. The usual surgical operations for hemorrhoids are regarded by S. L. Katzoff[8] as barbarous, unscientific and unnecessary.

He presents the following practical points:

If the inflammation has been reduced and the astringent ointment is insufficient, good results may frequently be obtained by applications of Monsel's solution of persulphate of iron with a brush once or twice daily.

He also recommends equal parts by weight of tannin and glycerine anointed once, and in severe cases twice daily. He considers common table salt unsurpassed as a remedy for bleeding biles.

Applications of collodion to external hemorrhoids will support the pile and stimulate its contraction. It may be dropped on a few fibers of cotton, which are spread over the pile each morning after defecation. Gradually increased dilatation of the rectum will sometimes bring about the desired result, and will be helpful in almost every case.

The injection methods consist in shaving the hair around the anus, cleansing the parts thoroughly, then,

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(7) November, 1918.
(8) New York Med. Jour., Dec. 21, 1918.

after having the pile in firm position, injection with a hypodermic syringe, of one or two drops of a mixture of phenol, one part, glycerine two parts in each pile, beginning with the smaller ones. He has personally employed the following formula at least 200 times:

	Gm. or c.c.
Phenol Salicylic acid } of each	6.0
Sodium biborate	4.0
Glycerine (sterilized) sufficient to make	30.0

One or two drops of this mixture in each pile will suffice to begin favorable results. After the injection, almost any usual ointment such as tannic acid ointment, belladonna ointment, stramonium ointment, and the like, may be smeared around the parts, and the usual reduction within the sphincter, retention and dressing may follow.

ALTERATIVES.

Iodide in Sporotrichosis. L. Ramond[9] describes a case, in which, on account of gummas on the trunk and arms, the patient was given a course of mercurial treatment, but without effect. The indolence of the gummas, their rapid development, the absence of fistulas and the arrangement of the lesions along the lymph routes finally corrected the diagnosis to sporotrichosis which was confirmed by cultivation of the pus. The lesions disappeared rapidly under administration of potassium iodide, beginning with small doses and increasing to a daily dose of 4 gm. Only exceptionally is more than this required, to a maximum of 8 gm. The patient was unable to bear the iodide by the mouth and was given it by the rectum.

Iodine in Prophylaxis of Goiter. C. Roux[1] suggests that an open bottle of tincture of iodine beside the bed at night might yield enough iodine to supply the deficit. Infinitesimal amounts are all that is necessary, more is harmful. Goiter must be prevented before it is discovered.

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(9) Progrès méd., April 19, 1919.
(1) Rev. méd. de la Suisse romande, May, 1918.

RESTORATIVE ORGANOTHERAPY.

Some Indications for Thyroid Therapy. J. L. Masterman-Wood[2] believes that hypothyroidism in its submyxedemic form, is very frequently seen in general practice and that it is no respecter of age. It is more common in females, who provide the clinician with the majority of cases for observing the varying degrees of thyroid inefficiency. At puberty, at each menstrual flow, during pregnancy and lactation, the gland enlarges, which is evidence of the body's demand for further supplies. These constantly alternating periods of augmented functioning and comparative quiescence render the thyroids of women peculiarly unstable. Among the exciting causes of this condition the author would give the toxemia of infection first place.

"There is no doubt," he says, "that in all toxemias the thyroid plays a very active and essential part, and that after severe illness in many cases it often ceases to function adequately. Clinically, many instances of this may be observed in children who previous to the onset of some acute infection have been normal in every respect, but who subsequently exhibit in varying degrees signs of failure of development and other stigmata of subthyroidism. Likewise adults under similar conditions show evidences which point conclusively to a breaking-down of the thyroid's efficiency, which may be temporary or the incipient stage of chronic benign myxedema. The truth of this can soon be verified by the administration of thyroid extract, which, if used with care and perseverance in such cases, not only aids defervescence, but greatly hastens convalescence."

The stigmata of subthyroidism are as follows: (1) slight want of mental alertness; (2) sluggish bodily movement; (3) slightly sleepy appearance of the eyes; (4) sluggish bowels and fetid stools; (5) retardation of general development; (6) appearance of enlarged tonsils and adenoids; (7) relaxation of spinal and plantar ligamentous supports, leading to lumbar lordosis and flat foot; (8) increase of weight out of all proportion to height; (9) nocturnal enuresis may be due to hypothyroidism, and such cases are relieved by minute doses of thyroid; (10) the definite and rapid improvement in every respect after opotherapeutic treatment.

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(2) Practitioner, May, 1919.

Masterman-Wood cites a remarkable disappearance of asthmatic attacks under thyroid medication, which leads him to call attention to the fact that the myxedemic is the pathologic prototype of the normal vagotonic individual with his ready response to cholin, and that peripheral stimulation of the vagus produces contraction of the bronchial musculature and a constriction in the lumen of the bronchioles, leading to a great diminution in the quantity of air inhaled and an over-distension of the lung—a state of affairs which apparently occurs in true spasmodic asthma.

Inefficient thyroid activity disturbs the normal balance which should exist between the sympathetic and autonomic systems. The latter is not sufficiently opposed, and is, in consequence, very responsive to stimulation of its peripheral twigs. Thus even slight stimulation of the vagal terminals is sufficient to produce reflexly powerful contraction of the muscles of the bronchioles and a resulting attack of asthma. To complete the picture, we must add the value of adrenalin. As is well known, an hypodermic or intramuscular injection of 5 to 20 minims of adrenalin hydrochloride (1-1,000) will, within the short space of five minutes, restore to the anxious sufferer his longed-for liberty to breathe. Masterman-Wood has never appealed to this remedy in vain, but success depends on the freshness of the solution. If exposed to air, or if kept for a long time, this preparation turns a pale pink color and becomes inert. The synthetic product, under the name of "epinine," is practically identical, chemically, with adrenalin, and, in the writer's experience, is equally efficacious. It has the added advantage of being stable, and, therefore, can always be appealed to with confidence. This action of adrenalin in alleviating the acute spasm of asthma can well be explained, if the stimulating influence of the suprarenal upon the sympathetic is remembered. It is quite conceivable that this substance, after injection, directly excites the cervical ganglia and thus temporarily antagonizes the hitherto uncontrolled vagus.

Interesting and of possibly great practical importance are the author's ideas regarding the relations of the therapeutic effects of iodides to the thyroid. He believes that not only do iodine compounds exert a profoundly stimulating influence upon the thyroid gland, but that it is in virtue of a more or less intact thyroid that they are able to produce their beneficient effects. Iodides fail entirely to relieve the symptoms in congenital, acquired, or operative myxedema. They have failed, as is well known, sometimes to quell the ravages of the syphilitic virus, probably due to a parlous state of the thyroid, produced by the toxemia which has completely paralyzed its functioning power for the time being. That this is so, is borne out by the fact that in certain cases of syphilis in which iodides failed to give relief at one period, the use of the drug can be resumed later with great resulting benefit. The author quotes Rendle Short, who has found "thyroid extract quite as effective as iodide of potassium in healing tertiary syphilis." This was certainly not unexpected upon theoretical grounds, and it will probably be found that where iodides fail thyroid extract may prove successful. Arteriosclerosis being one of the most outstanding and striking changes in congenital myxedema, the author considers it not unreasonable to attribute post-syphilitic vascular changes definitely to post-syphilis sub- or dis-thyroidism.

Masterman-Wood cautions us that with elderly subthyroidics possessing an enfeebled myocardium the greatest circumspection must be shown in employment of thyroid. Delirium cordis of a most alarming nature may supervene. Albuminuria is not necessarily a contraindication to the use of thyroid, unless this symptom is associated with clinical and laboratory evidences of definite kidney disease, when the remedy should not be employed. Albumin found in the urine of submyxedema unaccompanied by the presence of tube casts or renal cells, may disappear from the urine after restoration to normal health through the agency of thyroid extract.

During the administration of thyroid extract, patients frequently complain of pains of a "rheumatic" nature in various parts of the body. The primary "rheumatism," almost invariably referred to the inter-scapular region, for which the sub-myxedemic sometimes seeks relief, is often initially aggravated. In fact, on more than one occasion, this temporary exacerbation of the complaint, coupled with neuralgic pains in the legs and arms, has brought from the patient an emphatic remonstrance against the form of treatment employed. With perseverance, however, these symptoms disappear, and it is rarely necessary to prescribe anodynes.

Indeed for sufferers from so-called rheumatism, those chronic pains which the laity invariably class under this heading and which are usually localized in muscular and fibrous tissues, a very large proportion of whom have exhibited minor degrees of thyroid inefficiency small doses of thyroid extract alone, or combined in a mixture in the form of elixir with sodium iodide, work like a charm.

Of course, we must endeavor to discover in every case the cause of the thyroid's failure, otherwise, remission of the treatment will, in most cases, result in a relapse. Pyorrhea alveolaris, septic conditions of the nose, tonsils, pharynx, or vagina, or bones, are causes which must be remedied before a permanent cure can be recorded.

BLOOD TRANSFUSION.

Indications for Transfusion. Garbat[3] tabulates the indications for which transfusions are undertaken as follows:

1. To replace blood in hemorrhage of all kinds:
    (*a*) During the act of bleeding (and at the same time also to help stop the bleeding).
    (*b*) After the bleeding has stopped and an anemia with its sequelae remain.
2. To stimulate the blood-forming organs in blood diseases:
    (*a*) Pernicious anemia.
    (*b*) Leukemia.
3. To alleviate or cure hemorrhagic conditions:
    (*a*) Hemophilia.
    (*b*) Hemorrhagic diseases of the new-born.
    (*c*) Purpuras.

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(3) Jour. Amer. Med. Ass'n., Jan. 4, 1919.

- (*d*) Complicating secondary hemorrhagic diseases, as jaundice, grave anemia and infections.

4. To act as a stimulant or tonic:
    - (*a*) Before operations.
    - (*b*) In debilitated conditions.
    - (*c*) In acute shock.
5. To neutralize or overcome effects of poisons:
    - (*a*) Bacterial infections.
        - Bacteremia:
            - Endocarditis.
            - Infections with pyogenic bacteria; typhoid; etc.
        - Toxemia only:
            - Diphtheria.
            - Peritonitis, etc.
    - (*b*) Chemical:
        - Diabetic coma.
        - Acute gas poisoning.
        - Acute yellow atrophy of the liver, etc.

L. J. Unger[4] discusses the indications for transfusion as follows:

1. Hemorrhage: It serves not only to replace loss of blood, but also to check actual bleeding.

2. Diseases of the blood: In pernicious anemia, transfusion yields results superior to any other mode of therapy. By repeated transfusions, remissions can be effected and the lives of some patients made useful for years. In certain cases, however, even this procedure is of no avail. Hemophilia is not cured by transfusion; but for the bleeding of hemophilia, it is practically a specific. In purpura hemorrhagica, the results of transfusion are only fairly good. Repeated transfusions are often necessary to control the bleeding. In acute lymphatic leukemia, only a temporarily favorable effect can be secured by transfusion, even by most heroic transfusions. In bleeding of the new-born, transfusion is the specific. Temporizing by using less effective measures may cost the baby's life. This is especially true in cases of melena neonatorum, which are the most serious because we do not know just when the hemorrhage began or how much internal hemorrhage is taking place. Just as soon as the diagonsis of bleeding from the stomach or the bowel of the new-born child is made, transfusion should be performed.

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(4) Jour. Amer. Med., Ass'n., Sept. 13, 1919.

3. Toxemia: Especially in the toxemia of pregnancy and in toxemias associated with acute infections, such as pneumonia and typhoid fever, transfusion ought to be employed more frequently.

4. Infections: In localized pyogenic infections, transfusion will increase the patient's vitality and aid in overcoming the infection. When the source of organisms can be found and eliminated, the results are excellent, as in cases of sinus thrombosis following mastoiditis, in which the jugular vein has been ligated. In postpartum sepsis, on the other hand, only one patient out of about twenty recovered; the others showed merely temporary improvement.

5. Shock: Transfusion is at time valuable.

6. General Debility: Transfusion should be used preliminary to operations as a supporting measure, and thus lessen the postoperative mortality.

Hemorrhage and Blood Transfusion in the War. Bertram M. Bernheim[5] points out that among the important advances in medicine and surgery wrought in France during the war was the forcible demonstration of the great usefulness of blood transfusion. It was also shown that so far nothing has been found to take the place of blood, once a hemorrhage has passed beyond the limits of safety.

This war development is of real significance for, despite efforts to popularize blood transfusion and despite all the brilliant advances of recent years made in this line of work and the reports of innumerable lives prolonged and saved by its use, there has always existed in the profession generally an apathy toward it—a skepticism not only as to its efficacy, but also as to its need.

While salt solution may relieve the condition temporarily, it has little sustaining power, chiefly because it rapidly passes out of the blood-vessels into the surrounding tissues by osmosis. Blood, on the other hand, has real sustaining power because of its oxygen-carrying properties and its ability to remain intact as a circulating medium. Gum solution as a substitute for blood has

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(5) Jour. Amer. Med. Ass'n., July 19, 1919.

been a disappointment. It is Bernheim's opinion that if one-half the energy and time that were spent on gum solution had been spent on efforts to get blood and secure donors, we would have more to show for our efforts

Patients who had been given gum solution failed to react, and in certain instances the blood-pressure not only failed to show the expected rise, but actually fell; the fluttering pulse failed to steady and the depression even had a tendency to become more alarming than it already was. When salt solution was given instead of the gum, more intensive efforts were directed toward securing blood for those most in need of help and the results were gratifying.

Even so, the number of lives thus saved, compared with the number that might have been saved, was small —and all because blood in bulk was not obtainable, and salt solution, in many cases, would not answer the purpose. This is particularly true in the case of compound comminuted fractures of the femur in which the patient came in severely shocked by loss of blood, pain, hunger, fatigue and delay in getting him back to the base. Results were too often fatal in spite of immediate operation or the most judicious use of salt infusions until operation was considered feasible. When blood was obtainable, it was customary to give it just as the operation started, in order to tide the patient over, and those who received it invariably did better than those who did not.

In the base hospitals, a great light was shed on the value of blood transfusion in the anemia secondary to battle wounds. These were very common and most distressing cases. The men would lie pale, inert, unable to eat, nervous, day by day slipping back just a little, while their wounds not only failed to heal, but became increasingly dirty, until all bodily resistance being finally overcome, septicemia ensued and death resulted. Particularly was this true of bone and joint cases. A number of these men were transfused; and in nearly every instance prompt improvement followed.

Bernheim prefers the sodium citrate method owing to its simplicity, its elasticity, and the fact that it could be employed under circumstances that precluded the use of any other method. The author wishes that laboratory men would devise a method of preserving blood so that we could send for it to the drug store.

W. B. Cannon,[6] in an article on secondary wound shock, admits that there is little doubt that the best method for raising the blood-pressure is transfusion of properly matched blood, as by such means not only is the pressure raised, but oxygen carriers are added to the circulation. However, if blood is not available, he insists that Bayliss' gum-salt solution, made of selected pure gum in physiologic sodium-chloride solution, or Erlanger and Gassers modification of this solution, may be employed. These colloidal solutions, if used early, can permanently raise arterial pressure. They do so by increasing the circulating volume of fluid. There is no evidence that either the subcutaneous or intravenous injection of physiologic sodium-chloride solution has more than temporary value, if it has any beneficial effect at all.

End Results in One Hundred and Twenty-four Blood Transfusions. Major W. G. Waugh[7] of the British army gives the accompanying table of results from blood transfusions at the battle front. While he used indirect transfusion by means of paraffine-coated tubes (Vincent's method), the author considers transfusions of citrated blood best. He injected from 600 to 1,200 c.c.

The results in Class 2 indicate the usefulness of transfusion as a prophylactic against shock, and suggest that it should come into general use as a preliminary to severe operations.

Transfusion for pyemia has given sufficiently encouraging results to justify, in the author's opinion, the more general use of this method. It represents an attempt to do something further than merely drain secondary abscesses. Patients who recovered from some slight septic lesion were employed as donors.

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(6) Jour. Amer. Med. Ass'n., July 19, 1919.
(7) Brit. Med. Jour., July 12, 1919.

Clinical Condition and Operation Performed.	Cases Transfused.		
	No.	Recovery.	Death.
Class 1.			
(a) Secondary hemorrhage; ligation of main artery	52	35	17=32.7%
(b) Secondary hemorrhage; amputation of limb	14	10	4=28.5%
Class 2.			
Sepsis or gangrene; amputation of limb	39	35	4=10.2%
Class 3.			
Pyemia	19	12	7=36.8%
Totals	124	92	32=25.8%

Clinical Condition and Operation Performed.	Cases not Transfused.		
	No.	Recovery.	Death.
Class 1.			
(a) Secondary hemorrhage; ligation of main artery	52	28	24=46.1%
(b) Secondary hemorrhage; amputation of limb	14	7	7=50.0%
Class 2.			
Sepsis or gangrene; amputation of limb	29	20	9=31.0%
Class 3.			
Pyemia	..	..	....
Totals	95	55	40=42.2%

The Transfusion of Blood in Shock Produced by War Wounds. Out of approximately 1,600 grave untransportable cases, Lacoste, Lartigaut and Picqué[8] found only thirty-six patients in whom transfusion was indicated; thirty-three cases were due to hemorrhagic and three to non-hemorrhagic shock. In seven cases of this series they performed pre-operative transfusion on apparently moribund men who were pulseless, presented no arterial tension, and were insensible to artificial serums. Such men would have died at the beginning of the war before the eyes of the surgeon, whereas today many such patients, thanks to blood transfusion, can be put into condition to sustain an operation successfully. Immediate post-operative transfusion performed in order to improve the general condition of the wounded to whom the shock of an unavoidable immediate operation has come in addition to traumatic shock were also seven in number. These transfusions permitted the extension of the indications for surgical procedure in wounded men on whom formerly an operation could not have been attempted.

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(8) Paris Letter, Jour. Amer. Med. Ass'n., Sept. 20, 1919.

The authors find that the indications for blood transfusion should not be based solely on the result of the blood-cell count but rather more on the study of arterial tension.

Critical Periods in Disease Treated by Blood Transfusion. E. E. Lindeman[9]* considers it not unreasonable to conclude, in view of the complexity and importance of the blood—the highway for the carrying on of traffic on which animal life is dependent—that blood transplantation, in part or *in toto*, may favorably influence the course of many diseases other than hemorrhage and anemia, in which the indications are not so apparent, and that possibilities are opened for modifying the blood of a donor to meet specific needs in a given case.

Regarding sepsis, he does not regard the fulminating, vicious types of infections, such as occur in the puerperium, or the acute variety in which death occurs within a few days, as favorable types for this treatment, for these conditions become fatal before the treatment becomes operative. Neither are the results obtained in malignant endocarditis with *Streptococcus viridans* bacteremia encouraging. One's efforts are almost invariably defeated by the lodgment of emboli in the brain, lungs, liver, kidneys, spleen, etc., which ultimately result in the death of the patient. On the other hand, in long-standing cases of sepsis, even with bacteremia, the patient will frequently arrive at the point at which he has just enough protection to prevent further advance of the infection temporarily. The organism and the host then seem to exist side by side with indifference to each other until one of two conditions will prevail: the host will either overcome the organism, or the organism will advance further so as to ultimately to overcome the host. This may be regarded as a critical period in the disease of the patient, and all measures should be directed toward increasing the patient's resistance.

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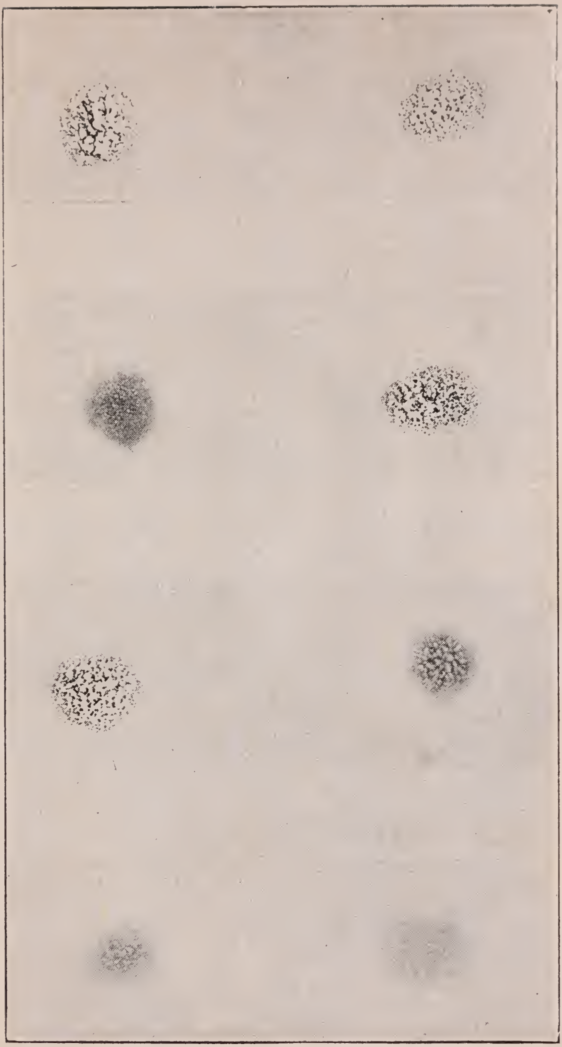
(9) Jour. Amer. Med. Ass'n., Sept. 20, 1919.

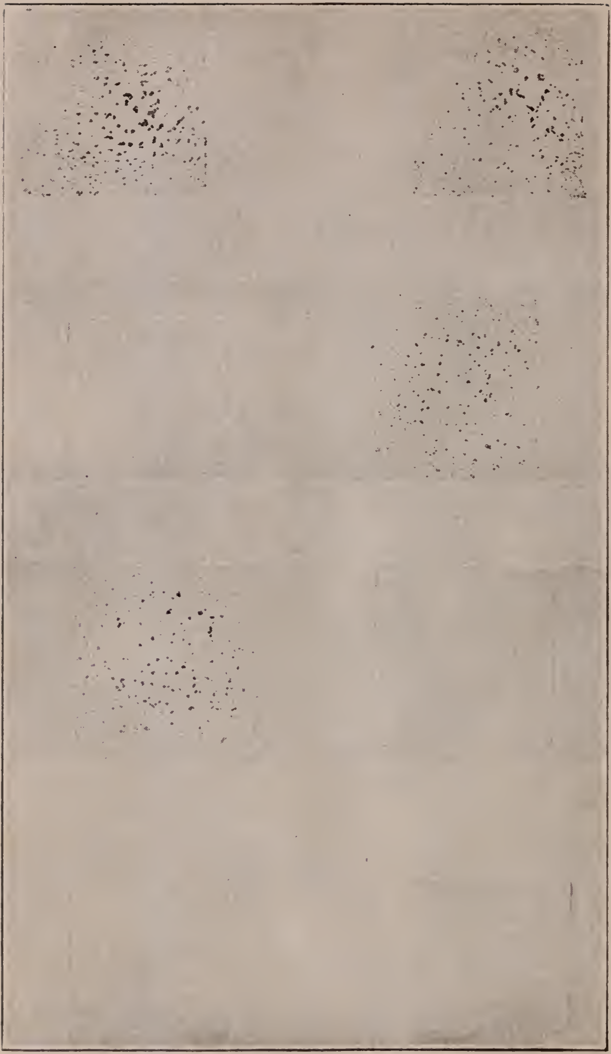
* Dr. Lindeman was accidentally drowned at Atlantic City, June 12, while bathing, on the very day on which he read his paper, at which occasion the wife of one of the patients, whom he actually resuscitated by blood transfusion, gave a rather dramatic unsolicited testimonial.—Ed.

PLATE I.



Group II serum is on the left-hand part of the glass slides while Group III serum is on the right. Blood from each of the four different groups has been mixed with both II and III serums. The top slide shows the agglutination of Group I cells by both Group II and Group III serums. The second slide shows agglutination of Group II cells by Group III serum, but not with II serum. The third slide shows agglutination of Group III cells by II serum, but not with III serum. The bottom slide shows no agglutination of Group IV cells with either Group II or Group III serum.—Vincent, page 98.

PLATE II.



This shows the same results as in Plate 1 except cover glass has been superimposed on the mixtures of known II and III and the blood of the different groups.—Vincent, page 98.

Blood transfusion is frequently an excellent procedure in these conditions.

When a patient has arrived at a critical period in pernicious anemia, there is no other therapeutic measure that has the power and efficacy of transfusion of unmodified blood in large amounts in robbing the disease of its terrors. Remissions may be provoked. When remissions can not be provoked promptly, the patient bears the disease better.

Lindeman reports five cases of tropical sprue, with apparent recovery in every case. It is unlikely that the mere improvement of the anemia is responsible for the cure of the disease.

Gas poisoning may be regarded in a measure as an anemia, for the oxygen-carrying power of the blood is reduced. In six cases of gas poisoning, all the patients but one recovered.

In nephritis one may encounter a critical period in which blood transfusion may prove helpful. The functional activity of the kidneys improves with the improvement in the blood condition.

Of course, in cases of hemorrhage, blood transfusion is specific, no matter how extreme the hemorrhage, provided some life is still present. To show that there is no condition so grave, in hemorrhage alone, that a patient can not be revived by blood transfusion, Lindeman cites the case of a man, who was so exsanguinated from hematemesis, that he was unconscious, with marked dyspnea and in shock. His respirations became fewer and fewer until they were mere occasional gasps. The attending physician could feel no pulse. A tourniquet was placed on the patient's arm but the veins did not distend. It was necessary then to make a small incision, exposing the medium basilic vein. Not a single capillary bled at the site of incision. There was no blood in the medium basilic vein; it presented itself, when exposed, as though it were a nerve trunk, and it looked like a piece of flat white tape. By this time the patient stopped breathing, and no heart sounds were audible with the stethoscope. It requires but a few seconds to deliver blood by the syringe-cannula system, but even these few seconds were too precious to lose and cold saline, which was the only thing at hand, was pumped into the vessels by the assistant until blood transfusion was started. Sixty ml. of saline were introduced in the interim. After the patient received 200 ml. of blood, he took an inspiratory gasp, followed by a paralytic expiration. When he had received 400 ml. he was breathing more regularly; a flicker of pulse was perceptible. When he had received 600 ml., there was a decided improvement in the pulse and an increasing depth of respiration. He opened his eyes and stared, but was not conscious. When he had received 800 ml. he became startled, as though suddenly awakened out of a sound sleep, and wanted to know what all the fuss was about. The transfusion was stopped when the patient has received 1,200 ml. The pulse and respiration were then quite satisfactory. He was then fully conscious and breathing normally. As his wife testified afterward, he is still alive today, though he required three other transfusions.

Compatibility Tests for Blood.

A Rapid Macroscopic Agglutination Test for Blood Groups. Beth Vincent[1] describes a macroscopic test which is simple and rapid and sufficiently accurate for practical purposes. A brief review of some essential points will make clear the method and use of this test.

Every human being belongs to one of four blood groups. This grouping is based on the agglutinating activity of human serum and the susceptibility of red corpuscles of agglutination. The four groups formed on this basis are thus described:

Group I: Serum agglutinates no corpuscles. Corpuscles agglutinated by serums of Groups II, III and IV.

Group II: Serum agglutinates corpuscles of Groups I and III. Corpuscles agglutinated by serums of Groups III and IV.

Group III. Serum agglutinates corpuscles of Groups

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(1) Jour. Amer. Med. Ass'n., April 27, 1918.

I and II. Corpuscles agglutinated by serums of Groups II and IV.

Group IV. Serum agglutinates corpuscles of Groups I, II and III. Corpuscles agglutinated by no serum.

There is no agglutination between serum and corpuscles of the same group.

The blood group to which an individual belongs can be determined by an agglutination test with his red blood corpuscles and the serums from individuals known to belong to Groups II and III.

The macroscopic test described is made by means of two citrated serums, Serum II and Serum III, obtained from the blood of two individuals belonging to Group II and Group III.

"To prepare the serums, 20 ml. of blood are collected from each individual under sterile conditions. When the blood has coagulated and the clot has contracted, the serum is pipetted off into two sterile flasks, and sufficient sodium citrate is added to obtain a citrated serum 1.5 per cent., and some preservative, as tricresol, 0.25 per cent. The serum is citrated to prevent the coagulation of the small amount of fresh blood mixed with the serum in making the test, which would make it difficult to determine the presence or absence of agglutination."

The serums may be kept for use in sealed small glass tubes or in bottles stopped with a combination rubber cork and medicine dropper.

The two prepared serums and a clean dry glass slide are all that is needed to make the test. One or two drops of Serum II are placed on the left half of the slide, and an equal amount of Serum III on the right half of the slide. The ear or finger of the person tested is punctured, and a small drop of blood is transferred on the point of the knife blade to each of the serums in turn. The blood is stirred into the serum. The blood should be transferred before coagulation has commenced, and care should be taken to avoid mixing the two serums. Agglutination of the corpuscles is accelerated if the serum is agitated by tipping the slide from side to side. If the reaction is negative, the corpuscles make a uniform suspension in the serum. If the reaction is positive, the masses of agglutinated cells usually appear in less than a minute and are readily discernible to the naked eye. With certain serums, rouleaux formation of the red corpuscles takes place and is sometimes confusing. Rouleaux formation usually appears more slowly than agglutination, and the rouleaux are broken up if the serum is disturbed, while agglutination is increased by this procedure. In doubtful cases, the reading should be confirmed by microscope examination (Plates I and II).

		SERUM				
	Group:	I	II	III	IV	
CORPUSCLES	I	0	+	+	+	I
	II	0	0	+	+	II
	III	0	+	0	+	III
	IV	0	0	0	0	IV
		I	II	III	IV	

Fig. 7. Relation of the four blood groups.

Study of the photographic reproductions shows the method of reading the tests. Plate I shows the macroscopic appearance of the known serums mixed with the blood of the different groups (the preparations have dried slightly).

It will be observed that these four different combinations of reactions conform to the two middle columns (between the heavy lines) in the accompanying table (Fig. 7). If a slide is superimposed on its proper row in these columns, the group number of the corpuscles at the end of the row corresponds to the blood group of the individual tested.

Except in cases in which the risk of delay is greater than the risk of hemolysis, the compatibility of the blood of donor and recipient should be determined before blood transfusions are performed. Hemolysis of the red corpuscles does not take place between members of the same group. Therefore, when possible, it is preferable that donor and recipient should belong to the same group. Recent clinical experience apparently has confirmed the fact that certain definite combinations of different groups can be made without danger of hemolysis. Members of Group IV may be used as donors for individuals belonging to Groups I, II and III, and a Group I recipient may be transfused from individuals belonging to Groups II, III and IV. Members of Group IV, therefore, are termed universal donors, and members of Group I, universal recipients.

The selection of donors by blood groups is made as follows: A Group I recipient may be transfused from any group, Group II and III recipients may be transfused from the same group or Group IV. A Group IV recipient requires the same group.

Simplification of the Method of Rous and Turner. This procedure has been satisfactorily employed by Unger[2]: "In a pipet used for counting leukocytes, one part of 10 per cent. sodium citrate and ten parts of the patient's blood are mixed. A similar specimen of the donor's blood is collected. From these specimens, by means of a third pipet, are mixed nine parts of the donor's blood to one part of the patient's, and also one part of the donor's to nine parts of the patient's. A drop of each of these mixtures is put on a slide, a drop of physiologic sodium chloride solution is added, a cover glass is applied, and examination is made under the microscope. Any clumping, not rouleaux formation, is agglutination, and this donor should not be used. Usually the clumping appears immediately, but it is wise to observe the mixture for fifteen minutes."

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(2) Jour. Amer. Med. Ass'n., Sept. 13, 1919.

TECHNIQUE AND METHODS OF TRANSFUSION.

Sodium Citrate Transfusion. Among the various methods advocated, K. F. Snyder[3] favors the citrate method as the most practical routine method because:

First, it obliterates the danger of recipient to donor contamination.

Second, the preparation of the blood requires no unusual skill in withdrawing the blood, in mixing it, or handling it.

Third, no attention need be paid to the danger of premature coagulation, after the blood is prepared, from defective preparation of paraffin surfaces or delay in injection, as the blood is not affected by the condition of the walls of its container or the transmitting system and may be kept for hours before injection.

Fourth, blood may be taken from the donor and transmitted to the bedside of the recipient at a distance.

Fifth, the danger of hemolysis is reduced to a minimum as by the technique of injection 10 ml. of the blood and interrupting the current for a few minutes to note any premonitory symptoms of this catastrophe serious results may be obviated.

The potential accidents to be guarded against are:

1. Incompatibility of the bloods, to be avoided by appropriate laboratory reactions.

2. The transmission of chronic or acute disease from one patient to another, which is to be avoided by a proper history and blood examination of the donor.

3. Acute dilatation of the heart, which is to be guarded against, especially in persons suffering with myocarditis and requiring massive doses of blood, and which is easily avoided in the citrate method by prolonging the time of infusion, but not so easily controlled in other methods where the time element is important and delay in infusion may result in premature blood coagulation and failure of the operation.

4. Air embolism, which is easily avoided by proper care.

5. Blood embolism, which is easily avoided in the

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(3) Ill. Med. Jour., August, 1919.

citrate method by proper technique and proper mild agitation of the blood as it comes into the citrate. It is not so easily avoided in other methods where potential coagubility of the blood is not altered by external means and actual coagulation, but awaits access of the air or a touch of foreign material to become inaugurated, and the life of the patient is endangered or the success of the transfusion destroyed.

The technique of the citrate method as described by Lewisohn is as follows:

The outfit for a blood transfusion consists of two small glass jars, two large glass jars, two glass ampoules containing 50 c.c. of sterilized 2.5 per cent. solution of sodium citrate, one large sized cannula for taking the blood from the donor, one small sized cannula for the injection of the blood into the recipient, one glass rod and a salvarsan flask with rubber and glass taper connection. The arms of donor and recipient are washed with soap, water and alcohol. If the veins are visible, iodine is to be used. A tourniquet is applied to the arms, causing moderate distention of the veins. A vein in the donor is punctured with a cannula of large diameter. It is important to insert the cannula properly so that the blood runs through it rapidly in a large stream. If difficulty is encountered in the proper insertion of the canula the vein may be exposed by a small incision. The blood is collected in a large glass jar. This glass jar contains half the quantity of sodium citrate needed for the transfusion. In other words, if 500 c.c. of citrated blood are needed we pour 25 c.c. of citrate in the large glass jar and add the residual 25 c.c. after we have collected 250 c.c. of blood. The blood is gently stirred with a glass rod to insure its proper mixture with the coagulant. After the collection of the required blood volume, cannula and tourniquet are removed and the wound is sealed. The recipient's vein is then usually exposed by a small incision. The cannula of smaller caliber is introduced, the salvarsan flask attached to the cannula, and the citrated blood poured into the glass flask. As a rule, 50 c.c. of salt solution are run through the tubing in order to prevent air bubbles from getting into the circulation of the recipient. The technical steps for the injection are exactly the same as those for an intravenous infusion of salt solution.

The experiments which Lewisohn published in 1915 showed that a very minute dose of sodium citrate (0.2 per cent.) is sufficient to prevent coagulation of blood for two days. Furthermore, these experiments showed the absolute atoxicity of such citrated blood for the human organism, even when large amounts of blood (for instance 1,500 ml.) are required as in cases of profuse hemorrhages. The coagulation time of the recipient's blood is temporarily shortened.

Analysis of One Hundred Transfusions. A. L. Garbat[4] publishes a study of one hundred cases of transfusions on sixty-eight patients. He adds to the advantages of the method given above, that citrated blood keeps well for days or even weeks.

Technique: The blood was usually collected into two large measuring beakers, each one holding 600 ml. or more. The blood was then filtered through several layers of gauze directly into an infusion flask or arsphenamin apparatus and allowed to run into the vein of the patient. Several technical points are of importance.

Agglutination and hemolysis tests must be done as a preliminary step to all transfusions. In no instance should an incompatible blood be employed.

"A large caliber cannula is used to get the blood from the donor so that the required quantity of blood is obtained in as short a time as possible.

"A large cannula is also used for the recipient with the same object in view. Naturally, there are limitations to this rate, depending on the particular illness or condition of the patient; for example, cardiac or pulmonary disturbances demand a slower current of blood, etc.

"The blood should be kept at body temperature while it is outside of the body and kept outside of the body as short a time as possible. This can be assured by transferring the blood from the receptacles in which it was collected into Erlenmeyer flasks or bottles, and these

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(4) Jour. Amer. Med. Ass'n., Jan. 4, 1919.

can be placed into a basin of warm water. Lewisohn has recently advised the use of vacuum bottles.

"Although it is absolutely essential to keep stirring the blood and citrate solution so as to mix them thoroughly and thus prevent coagulation, it is equally important not to stir too vigorously in fear of the possible physical destruction to the various blood constituents.

"The sodium citrate must be chemically pure and the water in which it is dissolved freshly distilled."

In the author's series of one hundred transfusions, 42 per cent. of the patients showed a definite reaction consisting of chilly sensations or chills, and fever; and, in the severest types, vomiting.

In the 42 per cent. there was a rise of temperature up to 103° to 105° F. in eight; there was a rise of temperature up to 102° to 103° F. in 19; there was a rise of temperature up to 101° to 102° F. in 15.

Many of these temperatures remained elevated only for a number of hours and came down rapidly by a form of crisis; in the others, the fever came down by lysis, and three or four days were required until the normal point was reached.

The chill usually comes on about one-half to three-quarters of an hour after the transfusion. If the blood flows in too slowly, as warned against above, this chill may come on during the time that the transfusion is being given, and this naturally is very disagreeable. These chills last from five minutes to a half hour. In contrast to malaria, subsequent perspiration is absent or only slight. In spite of the apparent severity, no harmful results either to the physical condition of the patient or to the value of the transfusion could ever be directly attributed even to such a reaction. Rise of temperature usually follows the chill and will persist for several hours; normal temperature may not be reached for three of four days.

While the percentage of reactions after the sodium citrate transfusions is undoubtedly higher, and possibly the reactions are severer than with the other methods of transfusion, they are at no time harmful in any way, and therefore should not influence one to select another method.

The one accident to be considered in sodium citrate mixtures of blood, aside from the accidents of transfusions in general, is the possibility of clotting. This is due to one of two causes: first, that the sodium citrate and blood were not thoroughly mixed; secondly, that a 0.2 per cent. mixture of sodium citrate and blood, that is, 50 ml. of a 2 per cent. solution of sodium citrate to 450 ml. of blood, was not sufficient for some donors, especially for donors who had already been used for transfusions. Both of these errors can be overcome, the first by stirring the blood and sodium citrate constantly, thoroughly, but gently; and the second by employing a 0.25 per cent. mixture, that is, 50 ml. of a 2.5 or even 3 per cent. solution of sodium citrate to 450 ml. of blood. To be even more certain that no minute clots slip through, the blood is filtered (through several layers of gauze) into the infusion apparatus.

Transfusion of Unmodified Blood. One of the differences between unmodified and citrated blood is the more frequent occurrence of reactions with the latter method. Drinker and Brittingham[5] state that, after citrate transfusions, febrile reactions occur in 60 per cent. of cases and a chill in 57 per cent. In L. J. Unger's[6] series, of unmodified blood transfusions, febrile reactions have occurred in about 10 per cent. and a chill in about 3 per cent.

There is no practical method for citration of the large quantities of blood needed for transfusion which certainly prevents the early changes of coagulation. These coagulative changes are associated with the platelets which become abnormal as soon as they leave the vessel.

Drinker and Brittingham have also shown that "the mere addition of a dose of sodium citrate" to red cells induces slight abnormality, as evidenced by an increased fragility and an increased tendency to hemolyze. This means that the corpuscles are damaged by sodium citrate, which is particularly disadvantageous, when

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(5) Arch. Int. Med., February, 1919.
(6) Jour. Amer. Med. Ass'n., Sept. 13, 1919.

transfusion is performed in hemolytic diseases. In such case, transfusion of unmodified blood should be the procedure of choice. It must be admitted, however, that the technique for giving citrated blood is simple and, therefore, that in cases of hemorrhage, citrated blood may serve as a substitute.

[When it is desired to provoke febrile reaction (see "Pyretotherapy"), then citrated blood would obviously be superior.—Ed.]

Unger gives the following data regarding dosage: A donor can safely supply one quarter of his blood volume. For infants, the usual dose should be from 80 to 150 ml. For adults, from 800 to 1,000 ml. Overtransfusion from the donor's standpoint is evidenced by an increase of pulse and respiratory rates, repeated yawning or deep sighing. Changes in the rhythm of respiration may occur before a change of the pulse rate. If these symptoms appear, the transfusion should be discontinued. As regards the patient, hypertransfusion is more serious. This may lead him to complain of precordial distress, headache, backache, or pain in his legs. A more important sign, however, is a short, sharp cough. If the transfusion is continued, the cough will be repeated. The cough, when it does appear, occurs irrespective of the rate at which the blood was transfused. One should not transfuse more than 200 ml. after the first cough. In only one case has this sign been disregarded. In this instance, 500 ml. were transfused after the first cough. This was the only case in Unger's series in which transfusion was complicated by hypertransfusion; pulmonary edema developed and the patient died.

Methods of Unger and Lindeman. The following two methods of transfusion of unmodified blood are of interest: Unger's and Lindeman's. The former requires a special apparatus, the latter does not. Unger believes that anyone seeing the two methods used side by side would come to prefer his.

Unger's[7] method utilizes the instrument described in the accompanying illustrations (Figs. 8, 9, 10). "The

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(7) Jour. Amer. Med. Ass'n., Dec. 29, 1917.

mechanical principle involved is the establishment of two channels by means of which a record syringe is automatically connected alternately with a vein of the donor and then with one of the recipient. At the same time that the record syringe is connected with the donor for the aspiration of blood, a syringe with saline solution is connected with the recipient, and *vice versa* (or better, permitted to flow by gravity method. In this way only one record syringe is required.) It is this immediate and continued flushing with salt solution of the channel through which blood is not passing that insures freedom from clotting."

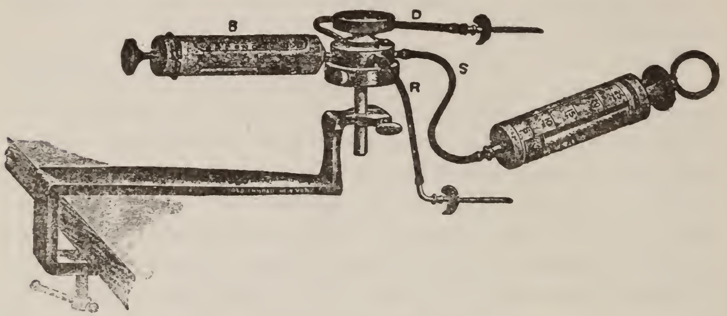

Fig. 8. Instrument for syringe transfusion: *D*, recipient's cannula; *R*, donor's cannula; *B*, record syringe for aspirating and injecting blood; *S*, saline syringe. At any one moment, saline solution is forced through that cannula through which blood is not passing. This automatic shunting is accomplished by the stopcock.

"The technique is as follows: Alongside the instrument, which has been fixed to a table, the arms of the patient and the donor are placed. The tubes leading from the instrument are connected to the cannulas after the latter have been inserted through the skin into the recipient's and the donor's veins. A record syringe is then inserted into the instrument, and blood is aspirated. When the syringe is filled, the stopcock is turned and the blood is injected. A continuous stream of saline solution is forced in a direction opposite to the flow of blood. This procedure is continued until the desired amount is transfused. By means of a spray, a stream of ether is played on the barrel of the record syringe while it is being filled with and emptied of blood in order to prevent clotting.''

Edward Lindeman[8] describes his syringe-cannula system as follows:

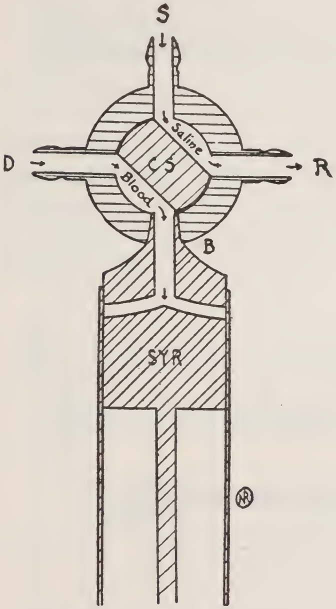

Fig. 9. Donor's position: *D*, donor's outlet; *B*, blood outlet; *SYR*, blood syringe. Blood passes from donor's vein through *D*, and out at *B* into *SYR*. *S*, saline outlet; *R*, recipient's outlet. Saline solution is forced from saline syringe through *S*, out at *R*, into recipient's vein. *C S*, central stopper (rotates through an arc of 90 degrees).

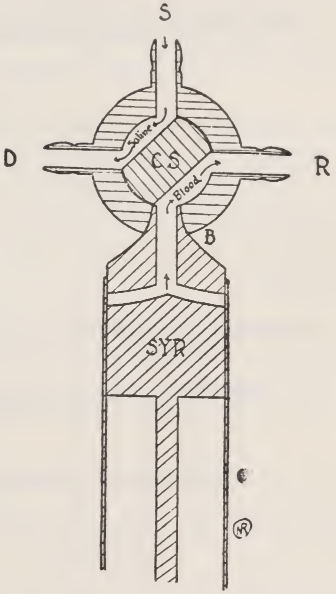

Fig. 10. Recipient's position; *SYR*, blood syringe; *B*, blood outlet; *R*, recipient's outlet. Blood is forced out of *SYR* through *B*, out at *R*, into recipient's vein. *S*, saline outlet; *D*, donor's outlet. Saline solution is forced from saline syringe through *S* out at *D* into donor's vein. *C S*, central stopper.

Two sets of cannulas are employed, one for the donor, the other for the recipient (Figs. 11-12).

There are three cannulas to each set (Fig. 12—1, 2 and 3). Each cannula telescopes within the other as shown in Figure 1.

The innermost cannula is practically a hollow needle,

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(8) Jour. Amer. Med. Ass'n., June 7, 1919.

2 6/16 inches long, 30-gauge, with one end ground to a fine point and short bevel. The hollow needle (Fig. 15—1) is fitted snugly into Cannula 2. Cannula 2 is 5 mm. shorter than the needle and is fitted snugly into Cannula 3. Cannula 3 is 5 mm. shorter than Cannula 2. The proximal ends of Cannulas 1 and 2 are capped with stationary thumbscrew caps. The proximal end of Cannula 3 is capped with a receiver to fit any record syringe.

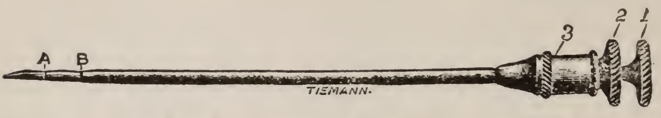

Fig. 11. *A*, distal end of cannula 2; *B*, distal end of cannula 3.

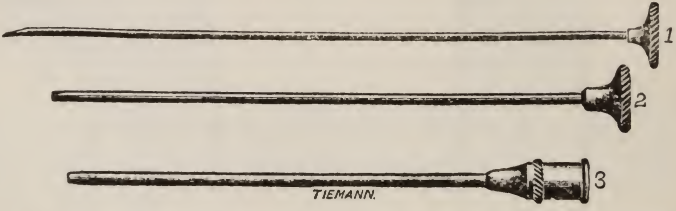

Fig. 12. 1, innermost cannula, or hollow needle; 2, middle cannula; 3, outer cannula.

Cannula 3 is 2 inches long, 14 gauge, 0.064 diameter. The caliber of this cannula is the same as the tip of a record syringe.

In very small infants with very small veins only Cannulas 1 and 2 are employed, Cannula 2 being capped with the receiver to fit the tip of the syringe.

The syringes can be sterilized in 95 per cent. alcohol for a period of ten minutes and then rinsed in physiologic sodium chloride solution to remove the alcohol.

Operation: The patient and the donor are placed in recumbent posture in parallel position. The skin of the arms is sterilized. A small table is set between the patient and the donor. On this table are placed three basins containing sterile physiologic sodium chloride solution, at approximately room temperature, for the washing of syringes. A nurse stands behind the table and washes the syringes by rinsing each syringe in each one of the three basins. As long as the last rinsing basin contains sterile normal salt solution, the other two may contain sterile tap or distilled water or salt solution. A syringe is never used a second time until washed in these basins, hence no old or residual blood is allowed to enter the patient. These syringes are washed as rapidly as they are used. The third rinsing basin should remain clear throughout the operation.

One operator manages the syringe of the donor, the other operator that of the recipient. A tourniquet is placed on the arm of the patient to distend the vein. A cannula is then inserted into the vein by a skin puncture only.

Insertion of Cannula: When the needle has entered the vein a drop of blood is seen to trickle from the distal end of the innermost cannula. After the first joint A has entered the vein, Cannula 1 is withdrawn about one-half inch, thus preventing the vessel wall from being punctured or injured by the needle after the vein is entered.

With the thumb now on the screw-cap of Cannula 2, the cannula is forced further until joint B has entered the vein, Cannula 3 alone now coming in contact with the vessel wall. The latter is then gently pushed into the vein to a desirable length, usually from three-quarters to one inch. The tourniquet is then removed.

A cannula is then inserted into the vein of the donor in a similar manner. The tourniquet is placed on the arm sufficiently tight to obstruct the venous return, but not tight enough to impede the arterial flow, and remains on the arm of the donor throughout the operation. Everything is now in readiness for transfusion. There is no need of haste at this stage.

The obturator in the cannula of the donor is removed and an empty syringe is promptly attached and blood is withdrawn as rapidly as possible. When the syringe is filled, the assistant replaces it by an empty syringe, at the same time placing the filled syringe on the table. The operator places his thumb over the mouth of the cannula to prevent leakage during change in syringes.

The operator on the recipient picks up the filled syringe, attaches it to the cannula after removing the obturator, and evacuates the contents gently but speedily into the vein. As soon as the contents are evacuated a full syringe is again ready for evacuation. One syringeful of blood follows another in rapid succession until the desired quantity of blood has been transfused.

Small syringes of 20 ml. capacity are found most satisfactory. Larger sizes are not used because it requires a longer time to fill and empty them. The time elapsing for the filling and emptying of one syringe is from six to ten seconds. It is practically impossible for any chemical or physical change to take place in that short space of time. Since the blood is transplanted in relay fashion, the entire mass of blood, regardless of the amount, is outside the body only so long as its takes to fill and empty one syringeful, namely, from six to ten seconds.

A little of the salt solution is squirted around the cannula occasionally to keep the field clean but none is injected into the vein of the patient.

Paraffin-Coated Tubes in Transfusion. As a result of experience at the front area, B. I. Harrison[9] arrives at the conclusions that timely blood transfusion for hemorrhage is a specific cure, providing the patient has not been in an exsanguinated state long enough to cause irreparable injury to the brain. For pure shock, early transfusion, that is transfusion before the "gray-blue" stage is reached, is useful, and is the most efficient treatment. Transfusion in the gray-blue stage is of little use. In this class, no other treatment has been useful.

The indirect method of transfusion was used, with the technique as shown in Figure 13. The tubes were coated with ordinary hard paraffin. A vein of the flexor aspect of the arm was used, 3 ml. of 1 per cent. procain being used for infiltration anesthesia. The proximal end of the donor's vein was tied, and the distal end of the recipient's, a ligature loop being placed around the distal end of the donor's vein and the proximal end of the

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(9) Jour. Amer. Med. Ass'n., Oct. 26, 1918.

recipient's. Traction by means of a hemostat closed the veins.

In this series of cases, there was no instance of coagulation in the tube. The average time for filling each tube of 300 ml. capacity was three minutes; for the entire transfusion, approximately thirty minutes.

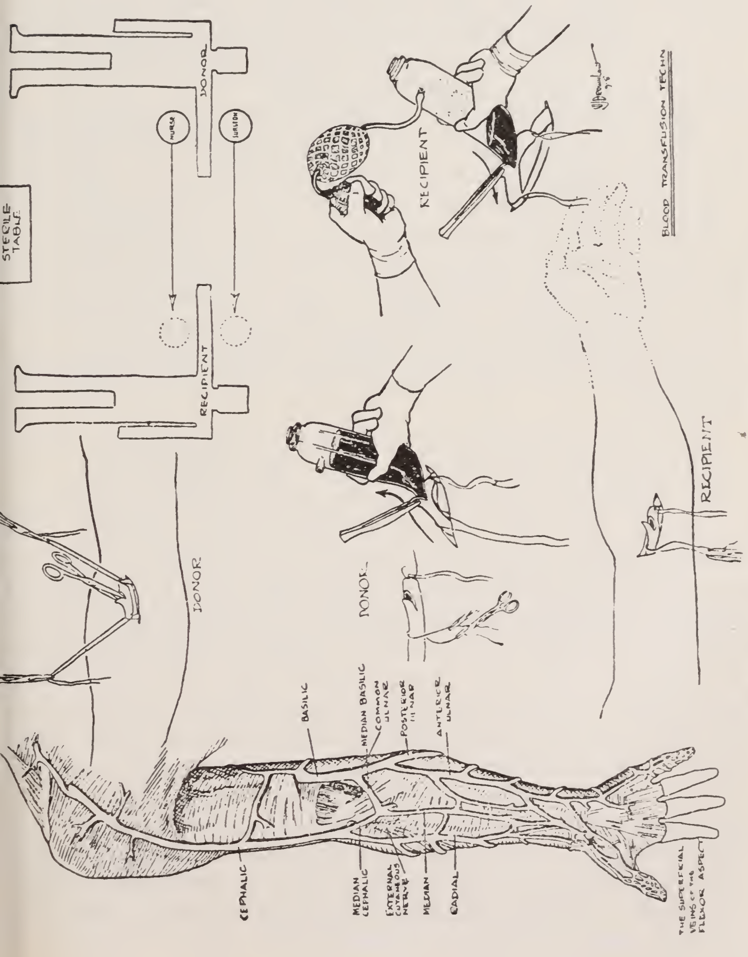

Fig. 13. Technique of blood transfusion.

HEMATINICS.

Intravenous Injection of Iron and Arsenic. Albert G. Geyser[1] considers the intravenous method the best for the introduction of iron and arsenic in the anemia of chronic ailments. When these drugs are given by mouth in the form of Blaud's mass, months even years are required before any real therapeutic benefit manifests itself. Intramuscular treatment required weeks and months and will never become popular on account of the pain and frequent abscess formation.

Since the introduction of the intravenous method all this has been changed. The solutions are free from all irritating qualities, they are injected directly into the vein and so are spread over the entire body surface in a few seconds. They perform their therapeutic function at once and in the right place. With the iron and arsenic intravenous solution the dose of iron contained in each 5 ml. of the solution is 0.06 gm. of iron cacodylate. The therapeutic effects on the blood count and the hemoglobin index are demonstrated after the second or third injection.

The author describes the following technique: "The nurse cleanses the selected area with alcohol, then applies the blood-pressure apparatus and records the mean reading. As soon as the selected vein, usually the median basilic, stands out well, it is grasped between the thumb and fore finger of the left hand and pressed outward toward the skin surface. A twenty-three to a twenty-five gauge hypodermic needle is attached to an all glass syringe, the fluid drawn into the barrel and the needle inserted in a direction parallel to the vein. If the vein has been properly entered, dark blood will show in the syringe. The nurse releases the pressure and the fluid is slowly injected into the vein. Care must be taken that the fluid does not enter the muscular or cellular tissue. As soon as a localized swelling occurs, the injection must be stopped and the needle properly inserted. If the technique has been correct, there is neither pain, swelling nor reaction."

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(1) New York Med. Jour., Feb. 15, 1919.

HEMOSTATICS.

Local Hemostatics; Their Relative Value. To compare the efficiency of local hemostatics, Paul Hanzlik[2] devised a new method which briefly consists of continuous irrigation of the denervated and incised foot-pad of the dog with a non-coagulant solution, with and without the hemostatic, collecting the wash fluid for a definite period at intervals, and estimating a constituent of the blood in the wash fluid.

As the direct treatment of the wounds with various astringents which precipitate the blood, precludes the colorimetric estimation of hemoglobin or the counting of erythrocytes, the urease-aëration-colorimetric method was found the most convenient and practical means of determining the quantity of blood in the wash fluid.

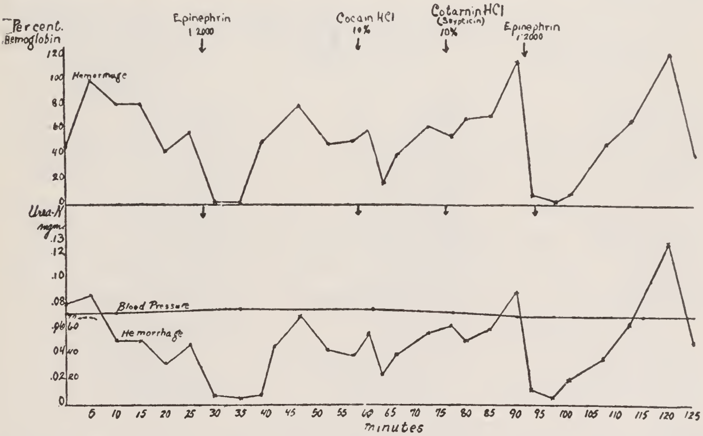

Fig. 14. Experiment 34. Comparison of the hemoglobin and urea-nitrogen content of blood and the effects or different local agents, during the course of hemorrhage from the dog's foot-pad. Irrigations with 1 c.c. for 15 seconds were made with each solution.

Figure 14 shows the correspondence between these two methods of estimation, as well as some of the effects obtained. A summary of the experimental results is given in the accompanying table.

From a study of this table it will be seen that the

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(2) Jour. Pharm. and Exp. Therap., September, 1918.

local application of vasoconstrictor and astringent agents diminishes or arrests local hemorrhage, while vasodilator and irritating agents (without astringent action) increase local bleeding.

The most efficient and desirable hemostatic of all the agents that were tested is epinephrine. However, its action is temporary and almost invariably the bleeding is increased as an after-effect; and, therefore, it should not be relied upon for effecting permanent hemostasis. Tyramin and pituitary extract act similarly though not quite as effectively, and they do not increase the bleeding later.

Classification of various local agents on hemorrhage from the dog's foot-pad

Diminished.

- Acetic acid
- Atropine
- Barium chloride
- Caffeine
- Calcium chloride
- Cane-sugar
- Cocaine
- Digitalis
- Epinephrine (1:1,000,000 and higher)
- Ferric chloride
- Glycerite of tannic acid
- Hydrochloric acid
- Morphine
- Normal saline
- Peptone, 10 per cent.
- Pituitary extract
- Quinine
- Quinine-urea hydrochloride
- Silver nitrate*
- Sodium bicarbonate
- Sodium chloride, 10 per cent.
- Strophanthus
- Tannin
- Turpentine
- Tyramin
- Zinc sulphate

Increased.

- Alum
- Antipyrine
- Apothesine
- Beef serum
- Berberine
- Chelidonin
- Chloral
- Chlorazene
- Dichloramine-T
- Emetine
- Epinephrine (1:10,000,000 to 50,000,000)
- Ergot, fluid extract
- Horse serum
- Hydrastis, fluid extract
- Hypochlorite solution (Dakin's)
- Hydrastinine hydrochloride
- Narcotine
- Nitrite
- Novocain
- Orthoform
- Papaverin
- Peptone, 5 per cent.
- Salicylate*
- Stovaine
- Stypticin
- Styptol

Unchanged or Variable.

- Aconite*
- Camphor
- Coagulen (Ciba)
- Gelatine
- Histamin
- Kephalin
- Lactose
- Menthol
- Permanganate
- Sparteine*
- Thromboplastin (Squibb)
- Veratrum*

* Only one trial was made with these drugs. Their position may change with more experiments.

The astringents as a class were effective, though variably, in diminishing bleeding. The most effective were ferric chloride and tannin. Alum was disappointing. With high concentrations the bleeding was even increased.

The results of this investigation and a study of the literature leave considerable to be desired as to the real merits of the general class of local hemostatis agents. Styptics play at all events a minor rôle in the control of hemorrhage.

The recognized importance of other factors, such as pressure, leaves the importance of hemostatic agents in doubt.

As far back as 1657, Rhaenodaeus advised "that thou mayst stay bleeding, touch the part with thy ring finger, and repeat these words, Socnon, Socnon, twenty-seven times, or as oft as thou wilt, till the issue cease; it is good, and much profitable, if you rightly consider it."

[Socnon is evidently just as effective as the use of some of the alleged styptics.—Ed.]

Effects of Various Systemic Agents on Superficial Hemorrhage. Paul Hanzlik,[3] using essentially the same method described above, tested the hemostatic efficiency of various agents injected into the circulation.

Any changes in local bleeding produced by the method of study used must be through local effects on the blood-vessels, exclusive of the central nervous system, or on the blood itself (such as viscosity, etc.), providing the blood-pressure remains unchanged. The most important external factor concerned in changes in local bleeding is the systemic blood-pressure. This was carefully observed in all experiments. Unless vasoconstriction occurs, even a slight increase in blood-pressure is almost invariably accompanied by an increase in bleeding.

The experimental results are classified in the accompanying table:

The data obtained indicate that epinephrine was the most effective of all the agents tested. The rise of blood-pressure produced by epinephine was always accompanied by a prompt and marked diminution or arrest

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(3) Jour. Pharm. and Exp. Therap., September, 1918.

(from 30 to 100 per cent.) of hemorrhage. The maximal hemostatic effects appeared in about eight minutes and the hemostatis lasted for about fifteen minutes (range from eight to forty minutes).

Classification* of various agents acting systematically on hemorrhage from the dog's foot-pad

Bleeding Diminished.	Bleeding Increased.	Bleeding Variable or Unchanged.
Cotarnine hydrochloride (stypticin)	Asphyxia	Emetine (subcutaneously)
Digitalis	Gelatine	Horse serum
Epinephrine	Kephalin (Howell)	Pituitary extract
Ergot	Nitrite	Thromboplastin (Squibb) (intramuscularly)
Hydrastis	Normal saline	Beef serum
Thromboplastin (Squibb)		Coagulen (Ciba)
Tyramin		

* Irrespective of changes in blood-pressure. The relation of this to changes in bleeding is considered in the text, hemostasis by some agents being accomplished at the expense of a considerable fall of blood-pressure as with cotarnine, for instance.

Tyramin appears to be less effective.

Pituitary Extract does not appear to be reliable as a hemostatic.

Under the condition of wound irrigation, systemic administration of the thromboplastic agents (kephalin, etc.) can not throw any more light on the efficacy of their natural role in the stoppage of bleeding than local application. The results indicate that thromboplastin, coagulen, and kephalin were variable or ineffective as hemostatics when injected intravenously. The course of the bleeding was parallel with the changes in the blood-pressure. That is, bleeding generally increased with increase in blood-pressure and *vice-versa*. The effects were, therefore, chiefly mechanical. The results of these experiments do not support the favorable claims that have been made for these bodies.

It is possible that the effects would be different with prolonged administration.

Cotarnine does not seem to act as a systemic hemostatic *per se* without a marked fall of blood-pressure.

[The systemic hemostatic efficiency of epinephrine, found in these experiments, which is contrary to views generally held, might be of therapeutic importance.—Ed.]

The Arrest of Bleeding in Certain Diseases of the Blood. W. Gemmill[4] suggests applying a drop of blood from a normal individual, obtained by pricking the finger, to a small wound such as punctures for blood examination or small cuts in patients whose blood is deficient in powers of coagulation, and in whom bleeding has been persistent and dangerous.

To be successful, the bleeding point must be held firmly, exposed between the fingers and the thumb of one hand, dried thoroughly, and the pressure continued until the drop of blood which has been applied coagulates. It may then be relaxed without fear of further bleeding. Of course, the patient must be warned against knocking off the coagulated drop.

Effect of Bile on the Clotting Time of Blood. Experiments performed by H. Haessler and Marianne G. Stebbins[5] led to the conclusion that bile and bile salts do not interfere with the formation of thrombin, since the prolongation of clotting time is just as great when preformed thrombin must be formed from its precursors in the presence of bile. It can not be a question of destruction of the thrombin, as Morawitz and Bierich (1907) showed that a quantity of freshly drawn blood which had been mixed with enough bile to inhibit clotting, could be caused to coagulate by merely diluting the mixture with isotonic salt solution. Consequently, we must assume that it is the conversion of fibrinogen to fibrin that is interfered with rather than the formation of thrombin.

[Hence, the use of hemostatic serums that owe their activity to thrombin are likely to prove disappointing in checking the bleeding of the jaundiced.—Ed.]

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(4) Brit. Med. Jour., July 5, 1919.
(5) Jour. Exp. Med., May 1, 1919.

OXYGEN.

The Value of Oxygen Inhalation. J. S. Haldane[6] again emphasizes the therapeutic importance of oxygen inhalation in ''anoxemia,'' which he defines as a condition in which the rate of supply of oxygen to the tissues by the blood in the systemic capillaries is insufficient for the normal processes of life.

Clinically the condition is very common. It is a very dangerous complication in pneumonia and in bronchopneumonia, especially the very fatal pneumonia of influenza. Indeed, in all diseases the important cause of death is practically always anoxemia; and, as death is not only mere stoppage of the machine but also its total ruin, so partial anoxemia means not only a mere slowing down of life, but progressive and perhaps irreparable damage to living structure. Of these, the respiratory center is the tissue most affected.

The respiratory center responds to oxygen deficiency with increased activity, and this brings more oxygen to the lungs. Now when along with deficiency of oxygen there is excess CO_2 in the lungs, as is usually the case, the increased breathing brings relief in the normal way. But when there is no excess of CO_2, the increased breathing washes out an abnormal amount of CO_2 from the blood. This, it has been shown recently by Bohr, diminishes the dissociation curve of oxyhemoglobin; in other words, hemoglobin holds on more tightly to oxygen under these conditions. This effect of carbonic acid in altering the qualities of hemoglobin is due to its acid properties. When the hemoglobin holds on more tightly than usual, we have an anoxemia with the blood of a normal red color. This anoxemia can be relieved by breathing oxygen.

An evil effect of anoxemia on the respiratory center, is the production of rapid and shallow breathing, which it has been shown has a tendency to lead to excessive loss of CO_2 without corresponding increase in the amount of oxygen. When we add to this the production of

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(6) Brit. Med. Jour., July 19, 1919. A previous communication on this subject was abstracted in this series, Vol. VIII, 1917, p. 146.

fatigue of the respiratory center and its ultimate exhaustion, we can see that anoxemia requires active treatment in its early stages. We have here a vicious circle, which is liable to lead to death, unless broken in upon early and efficiently.

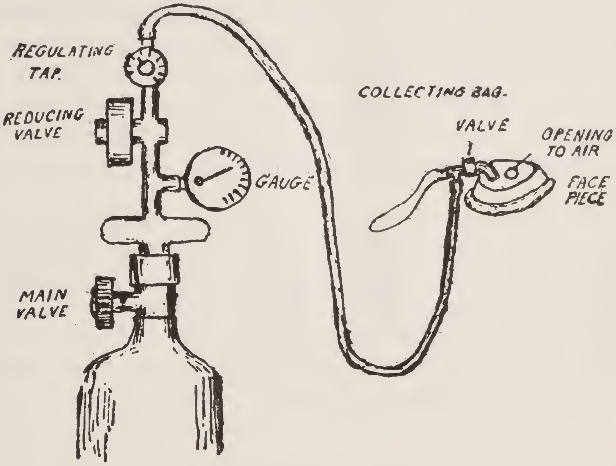

Fig. 15. Showing the arrangement of this apparatus. It consists of (1) a pressure gauge showing how much oxygen is in the cylinder; (2) a reducing valve which reduces the pressure to a small amount which remains constant till the cylinder is exhausted; (3) a graduated tap indicating the flow of oxygen in liters per minute; (4) light thick-walled rubber tubing conveying the oxygen to the patient; (5) a small flexible collecting-bag connected with the face-piece through a non-return mica valve which prevents expired air from entering the bag; (6) a face-piece provided with elastic straps and a rubber pneumatic cushion which can be taken off for disinfection. The patient can inspire and expire freely through an opening in which there is a rubber flap to cause a very slight resistance. During the expiration the oxygen collects in the bag, and is sucked into the face-piece at the beginning of inspiration. From the movements of the bag it can be seen at any moment whether the patient is receiving the oxygen. To put the apparatus in action the main valve is opened freely and the tap adjusted to give 2 liters a minute, or whatever greater or less amount suffices. With a delivery of 2 liters a minute a 40-foot cylinder would last nearly ten hours. This apparatus can be obtained from the manufacturers, Messrs. Siebe, Gorman and Co., London.

For the efficient and at the same time economic administration of oxygen, Haldane has devised an apparatus (Fig. 15), that has been used extensively by the

British army in France, especially in treatment of gas cases.

Oxygen chambers for the continuous administration of oxygen have been installed at Guy's Hospital and also at Stoke-on-Trent. These chambers have many advantages; however, their initial cost is heavy.

[The fact that the probably approaching epidemic of influenza will again bring us face to face with desperate cases of anoxemia, and the importance of being prepared to handle them efficiently and early—before they have become desperate—make it very desirable that some such apparatus be readily obtainable in this country.—Ed.]

B. Moore[8] suggests that, inasmuch as in anoxemia the organism, in trying to get enough oxygen, exhales its carbon dioxide to a dangerous degree, so that blood and tissues become too alkaline, the administration of a mixture of 90 per cent. of oxygen with 10 per cent. of carbon dioxide be used for enriching the air through Haldane's ingenious apparatus.

IMMUNIZATION.

The only successful antitoxins for passive inmunization so far produced are those against the exotoxins, such as are developed by the diphtheria and tetanus bacilli. Immunity can, however, be developed against the actual germ substance of the endotoxin bacteria by active immunization (vaccines). The toxic effects of these bacterial bodies have, however, limited the amounts of vaccine that could be injected. Attempts to lessen these toxic effects have resulted in the production of lipovaccines, sensitized vaccines, and other forms of detoxicated vaccines. While we are becoming acquainted with the limitations of specific immunization, a vista of great practical possibilities is opened up by the study of nonspecific immunization, an important means of which is the production of fever—pyretotherapy.

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(8) Brit. Med. Jour., July 26, 1919.

ACTIVE IMMUNIZATION.

Disappointments of Vaccine Therapy. H. G. Adamson[9] sounds a note of warning by calling attention to the fact that most dermatologists will hesitate at the present time before embarking a patient afflicted with sycosis or other chronic staphylococcus infection of the skin upon a course of vaccine treatment. He will, perhaps, as a last resort employ vaccines; but he will hesitate, since it is not possible to predict with any certainty that the patient will eventually be benefited. Anticipation of a cure will generally be in inverse proportion to his experience of the treatment.

Good results are occasionally observed with vaccine treatment in the less chronic forms of staphylococcus infection of the skin, in recent furunculosis, and in pustular acne which is not of long standing; but such results are by no means constant. Most dermatologists will not now recommend tuberculin treatment as a likely cure for lupus vulgaris, and many will avoid it as being fraught with danger.

While preventive vaccination has a sound foundation, when we come to the cure of an already present infection we have altogether different conditions.

We must not lose sight of the fact that a person who has been infected is in a state of allergy or altered reactivity, or hypersensitiveness toward the toxins of microörganisms by which he is infected, so that the reaction which may result from even a minute dose of vaccine may be enormous in proportion to that which would occur from the same dose in an uninfected person; and such an excessive reaction may be followed by a period of exhaustion of immunity or "anergy." The danger of the proceeding of so-called curative vaccination is that we can not estimate the result. A vaccine may set up in an infected subject an explosive reaction whose force we are quite unable to predict or control.

The opsonic index as a measure of the production of protection bodies by vaccination has proved altogether

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(9) Lancet, Aug. 10, 1918.

unreliable, and we have no other reliable means of knowing the proper dose of vaccine.

As Sir Almroth Wright has put it: "The body has the machinery for immunization, and you can play tunes upon it if you know the laws. If you do not happen to know the laws when playing upon it, it may be quite injurious."

To this Adamson adds that "the uncertainty of the results, for most part the disappointing results, of vaccine treatment should perhaps make us pause and ask: Are we at present in a position to play tunes upon the machinery of immunization by means of vaccine after the machinery has already been set in motion as a result of microbic infection?"

It may be that vaccine treatment sometimes gives dramatically successful results, and we are perhaps justified in giving this treatment a trial in certain cases of infection where other treatments have failed; but the still prevalent tendency to employ vaccines indiscriminately in all sorts of complaints should be deprecated, because we are not really in a position to know when we may do good and when we may do harm by this treatment.

Some New Prospects in Therapeutic Immunization. Sir Almroth E. Wright[1] finds it necessary to introduce a number of new technical terms to facilitate discussion and to render certain ideas more concrete. To combat bacterial infection the organism must have defensive powers which we may call "*phylactic power.*" The leukocytes and the bacteriotropic substances in the blood fluids we may call "*phylactic agents.*" But we must have not only "phylactic power" in the blood, but also provision for the transport of leukocytes and bacteriotropic blood fluids to the site of infection. Let us call this transport of phylactic agents to the site of infection "*kata-phylaxis*" (We have a similar use of the prefix "kata" in kataplasm and kataphoresis); and let us term any condition which interferes with that transport an "*anti-kataphylactic influence.*"

"Phylaxis" and "kata-phylaxis" are the defenses of

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(1) Lancet, March 29, 1919.

the body. But there are also resources in reserve. By a process comparable to a mobilization for the reinforcement of a standing army, the phylactic powers of the blood fluids can be increased. We may call that *"epi-phylactic reinforcement"* or *"epi-phylactic response."* Such "epi-phylactic response" manifests itself in connection with all infections that give rise to constitutional disturbance. And such response follows upon bacterial inoculations when conducted with appropriate doses. But there follows directly upon the inoculation of a large dose always a phase of diminished blood resistance called a "negative phase." It would be more conformable to the system of terminology, now advocated, to employ here the term *"apo-phylactic phase."*

An *"ec-phylactic region"* is a region in which the guardian elements of the blood have been rendered impotent or, as the case may be, have been excluded. Such region is produced by the abolition or suspension of the circulation by injury to the blood-vessels or exposure to cold. Much more commonly the "ec-phylactic region" has been fabricated by a bacterial colony. Every living bacterial colony must become the center of an "ec-phylactic" sphere: (*a*) by radiating out toxins which will (when of sufficient strength) repel leukocytes; (*b*) by absorbing bacteriotropic substances from the blood fluids; and, probably (*c*) by abstracting antitryptic power from the blood fluids and so converting these into a congenial culture medium.

"Ec-phylactic foci" may also become established by exudation of fluid. Where that occurs the leukocytes are—so far as any phagocytic activity is concerned—put out of office and the infecting microbes are—so far as phagocytic attack is concerned—safe. Leukocytes, though of course they will emigrate into such an area, can not swim or transport themselves from place to place in a fluid medium. They can only crawl along surfaces and creep along the trellis work of the tissues.

"Epi-phylactic" response will be interfered with when the patient is suffering from continuous or frequently recurring conveyance of bacterial toxins into the blood. So long as the patient is thus tormented by auto-inoculations, we can effect nothing by vaccine therapy. In such a case the proper remedial measure is to abolish the auto-inoculations. The best procedure is to incise and evacuate the contents of the focus of infection. Where this is inapplicable, we must have recourse to immobilization. In the case of a more extensive infection, the program of ''absolute rest'' is imperative.

Vaccine-therapy less frequently makes shipwreck through default of ''epi-phylaxis'' than through shortcomings in ''kata-phylaxis.'' Frustrated ''kata-phylaxis'' accounts for almost all failure in the treatment of bacterial disease. Microbes can establish themselves in the organism only under two circumstances: first, when they find access to a region rendered ec-phylactic by interference with the circulation or other anti-kataphylactic agency; and, second, when they succeed in fabricating for themselves an ec-phylactic environment. An ec-phylactic area once established, special measures will be required to bring the leukocytes and protective substances of the blood fluids into application.

Three different types of kata-phylactic measures may be resorted to: (1) The contents of the ec-phylactic focus may be evacuated. Then by the emigration of fresh leukocytes and the transudation of fresh serum physiologic conditions will spontaneosly establish themselves in the focus of infection; (2) normal conditions may be restored by augmenting the transudation of lymph into the focus of infection and displacing and expelling by this agency the ec-phylactic lymph; (3) physiologic conditions may be restored by processes of simple diffusion.

1. *Kataphylactic Measures.* Procedures for evacuating the ec-phylactic fluid into the exterior are:

(*a*) *Incision.* But, even under the happiest conditions, incision will give us only an incomplete draining away of the ec-phylactic fluid.

(*b*) *Incision and cupping.* However, in any case, in extracting lymph by Klapp's method the same difficulties will confront us as when we employ negative pressure to draw a coagulable fluid through a paper filter.

The filter very soon becomes obstructed and then it is very likely to tear, and we never can get much fluid through.

(*c*) *Application of hypertonic salt solution to a naked tissue surface.* This will suck out ec-phylactic lymph from infected tissues.

(*d*) *Application of irritant solutions to naked tissue surfaces, as e. g., the application of solutions of the hypochlorites—such as Dakin's fluid, concentrated phenol and certain other antiseptics.* These cause an outpouring of lymph from the wound.

2. *Procedures for Restoring Normal Conditions by Augmenting Transudation from the Blood and Displacing and Driving Out the Ec-phylactic Fluid from the Focus of Infection.* (*a*) The application of fomentations; (*b*) The application of a Bier's bandage; and (c) Massage. The latter, of course, is generally inapplicable to an active focus of infection.

3. *Procedures for Restoring Physiologic Conditions in the Focus of Infection by Spontaneous Diffusion of Protective Substances from the Blood.* In the case of a focus which has attained a certain magnitude diffusion of protective substances cannot by any possibility happen, for the infecting microbes are incessantly obstructing the work of immunization. They are continuously paralyzing and repelling the leukocytes and depraving the blood fluid to their advantage, and thus they neutralize and more than neutralize the in-streaming protective substances. Added to that, when infection induces effusion, and the effusion gathers bulk, and the infecting microbes transform it, the transudation fluid is less and less affected by diffusion from the surrounding blood-vessels. We have here assuredly the explanation of the facts that we get as good as no success from therapeutic inoculations when dealing with large and unopened foci of infection; that we get much better results when the infective foci have attained only moderate dimensions; that we get very good results when dealing with very small foci; and our very best when, as in prophylactic inoculation, we are dealing with infecting microbes be-

fore they have had time to fabricate round themselves any ec-phylactic focus.

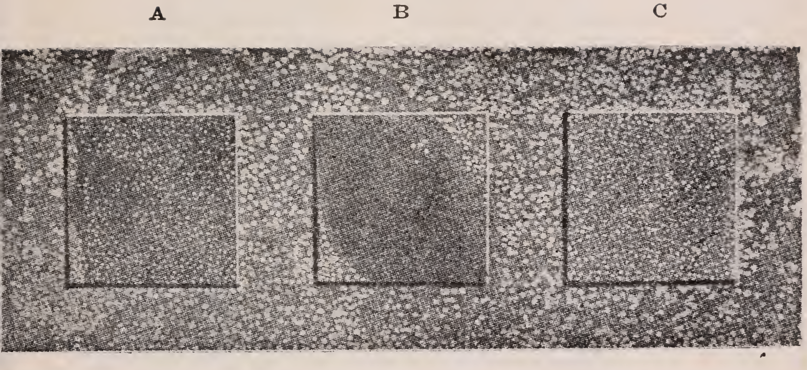
Of such dominating importance is efficient kata-phylaxis in the conflict that if we were to put our election, on the one hand, between efficient epi-phylaxis without kata-phylaxis; and, on the other hand, efficient kata-phylaxis without epi-phylaxis, we ought every time to choose the latter.

Types of Infection: We have in wounds two distinct types of infection. In a "foul wound" we have an exudate with antitryptic power and a multiform sero-saprophytic infection. In a "clean wound" we have an exudate with undiminished anti-tryptic power and a purely serophytic (*i. e.,* generally a streptococcus or staphylococcus and occasionally a diphtheroid) infection. We come therefore here to a broad therapeutic principle. A "foul" wound can be rendered "clean" and a sero-saprophytic can be converted into a purely serophytic infection, by bringing into the wound wholesome blood fluids. However, when we have converted a primitively "foul" into a "clean" wound, we can gain nothing by flooding the wound with blood fluids. We shall, in fact, by such treatment only be supplying fresh culture medium for serophytes. The body combats serophytic infections by the aid of the leukocytes, as is shown by the following experiments:

In Plate III we have a drop from each of the three layers of centrifuged blood imposed upon an agar surface implanted with a serophytic organism (in this case with staphylococcus). Each drop is then covered in with a cover-glass and the containing Petri dish is then incubated. The microbes have grown freely in the specimens made from the upper and lower layers of the blood, and the colonies are here quite as numerous as on the rest of the plate. But in the central area of the middle preparation, where we have an aggregation of leukocytes, every microbe has been killed off.

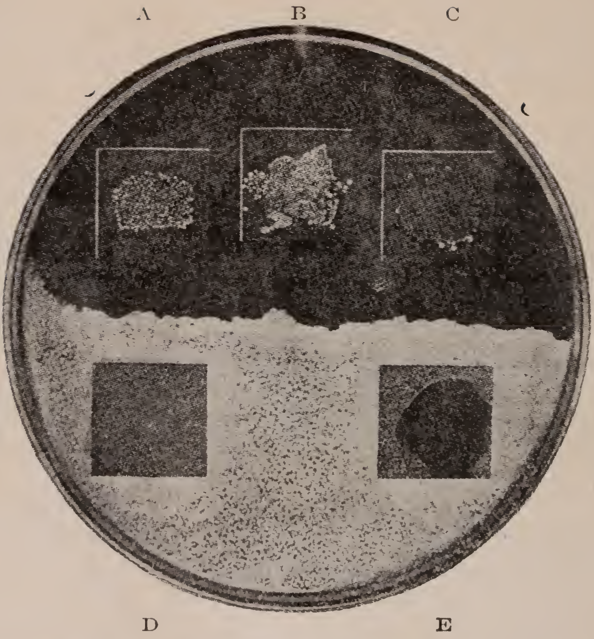
Plate IV shows drops of pus obtained from a clean wound, recently washed out, taken and spread on the surface of nutrient agar by the pressure of a cover-glass. In A, B and C the pus was imposed upon a sterile

PLATE III.



Drawing showing the effect of imposing an agar implanted with staphylococcus material from A, the upper layer (serum), B, the middle layer (leucocytic cream), and C, the lowest layer (red corpuscles), of centrifuged defibrinated blood.—Wright, page 124.

PLATE IV.



Drawing made after 24 hours of specimens of pus from a clean wound (recently washed out with normal salt solution) imposed under cover-glasses on sterile agar and agar implanted with staphylococcus. A, pus heated to 48° C. B, dried pus. C, living pus. D, pus heated to 48° C. E, living pus.—Wright, page 124.

surface, in D and E upon a surface implanted with staphylococcus. In A and D the cells were killed by heating to 48° C., which is the thermal death point of leukocytes; in B the pus cells were killed by simple desiccation. Thus, in A, B and D we have what may be called *necro-pyo-cultures*—that is, cultures made from a pus whose cells are dead. In C and E we have *bio-pyo cultures, i. e.,* cultures made from a pus whose cells are alive and active.

In necro-cultures A and B, the microbes of the pus have grown out into very numerous colonies. In sharp contrast with this is the event in the bio-culture C. Here the living pus cells have killed all the microbes with the exception of a few upon the circumference which have grown out in a marginal ring of serum expressed from the pus by the weight of the cover-glass. In D, which is again a necro-culture, we have a dense growth consisting of microbes originally contained in the pus with, in addition, those from the implanted agar surface. And finally in E—which again is a bio-culture—the pus has killed off not only its contained microbes but, in addition, those with which the agar surface was implanted.

These experiments teach us what we must do to extinguish sero-physic infection in wounds. They show us that, if the surface of the wound is not sterile, this is no reason for deferring suture. When we bring together two surfaces of a wound, each furnished with active leukocytes fresh from the blood-vessels, we are providing for those leukocytes far more favorable conditions than when we impose them in nutrient agar and cover them in with a cover glass; and, moreover, when we operate *in vivo,* we can count upon the continuous new arrival of leukocytes from the blood-stream. There are three main sources of failure: First, the leaving behind of corrupted pus, providing an ec-phylactic focus; second, the leaving of dead spaces, for dead spaces rapidly fill up with exudate which creates an ec-phylactic focus; third, the default of leukocytic emigration into the wound.

The weak point in our armor against the serophytes lies in this that the normal blood provides a culture medium in which serophytic microbes can grow and multiply. But the body responds to infections by the development of increased antitryptic power in the serum. That renders the serum a less favorable culture medium for serophytes. In addition to this, the serum in septic infections acquires a power of killing serophytic organisms and that bactericidal effect is exerted both upon the staphylococcus and upon the streptococcus concurrently, which brings up the issue of non-specific immunization.

That immunization is always strictly specific has counted as an article of faith; but we must now accept that there is such a thing as non-specific immunization. Thus the statistic results, obtained in the Premier mine, demonstrated that pneumococcus inoculations had, in addition to bringing down the mortality from pneumonia by 85 per cent., reduced also the mortality from "other diseases" by 50 per cent. Among many thousands of patients treated by vaccine therapy, it happened every now and then that a patient was treated with a vaccine which did not correspond with his infection and that that patient had indubitably been benefited. From such and other observation, hints are conveyed to us that there may exist a useful sphere of application for collateral immunization, and that we must discard the confident dogmatic belief, that immunization must be strictly specific. Hence, in cases which prove intractable to treatment with the homologous vaccine the possibility of seeking for collateral immunization by inoculating a microbe or mixture of microbes other than that with which the patient is infected should be considered.

Immune-Transfusion. Having found that an immunizing response can be obtained by incubating blood with bacterial vaccines *in vitro,* Wright believes in the possibility of what might be called "immune-transfusion."

When we have to deal with a general infection, and when surgical operations undertaken to abolish the ecphylactic focus have failed, and where immunizing responses can not be obtained, there still remains, as a last resource, transfusion. But simple transfusion—and the method has been extensively tried in this war—has in these cases proved unavailing. It has even been held to do positive harm. That should not be a matter for wonder when we reflect that the normal blood fluids provide for serophytic microbes an excellent cultivation medium—generally a more favorable medium than the blood fluids of the patient. The outlook for the patient would be much more favorable if we would take the donor's blood and immunize it *in vitro,* and so render the plasma bactericidal for the microbe with which the patient is infected. The author reports a case of streptococcus wound infection with extensive involvement of the sacrum and ilium, in which transfusion of blood immunized *in vitro* against the patient's streptococcus was followed by a very striking change in the patient's condition. The temperature promptly fell and the man rapidly became apyrexial. The wound also rapidly healed, and his serum, which before provided for the streptococcus a much better culture medium than our normal sera, was found after transfusion to inhibit the growth of this organism.

The knowledge gained by research during the war may be summarized as follows:

We can now see that the septic catastrophes of the earlier period of the war, were due to leaving foci in which serophytic and sero-saprophytic microbes could freely multiply. The felicitous results which have in the latter period of the war been achieved by timely opening up of the wound and the excision of all devitalized tissues, have been due to the fact that there was now not left behind any ec-phylactic focus in which sero-saprophytic microbes could cultivate themselves. Failures which have occurred when immediate primary suture was undertaken in presence of a streptococcus infection may almost certainly be set down to default of leukocytic emigration and exudation of blood fluids into the wound; while the success of retarded primary suture in cases of streptococcus infection is almost certainly due to free leukocytic emigration and the limitation of exudation. Whether we are dealing with preventive or therapeutic immunization, we can expect results only when we have good epi-phylactic response in combination with efficient kata-phylaxis.

Detoxicated Vaccines. Reasoning that against endotoxins, little or no immunity is developed, and that no advantage is to be gained by injecting the toxin and that it should be removed, if possible, so that larger doses of the actual germ substance may be administered, David Thomson[2] experimented along this line with, he believes, success crowning his efforts. He promises to describe the procedure adopted to attain this in a detailed paper almost immediately. He claims that he succeeded in reducing the toxicity of most germs some 50 to 100 times. Thus, with ordinary gonococcus vaccine, it was found necessary to begin in acute cases with doses not exceeding 5 millions and gradually to increase to about a maximum of 250 millions. On the other hand, the same strains of gonococci when detoxicated could be administrated in acute cases in doses of 2,500 millions and increased to 10,000 millions. These large doses caused even less toxic symptoms than the small doses of the ordinary vaccine, and a high degree of immunity as estimated by the complement-fixation test, was developed as well as more rapid recovery secured.

Experiments have been carried out with detoxicated vaccines for the prevention and treatment of bronchial and nasal catarrh and the results so far have been very promising. The clinical evidence is increasingly convincing to the author that this detoxication process will revolutionize the whole subject of vaccine treatment and preventive inoculation.

Preparation of Autogenous Vaccines for Treatment of Chronic Nasal Catarrh. L. Mackey[3] contributes a valuable report on his use of autogenous vaccines in over 500 cases of chronic catarrh during the past seven years. These patients were sent to him by their physicians because ordinary measures had failed to cure them. Before resorting to this treatment, the opinion of a throat surgeon was required that nothing abnormal

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(2) Lancet, March 8, 1919.
(3) Brit. Med. Jour., Aug. 9, 1919.

could be found beyond catarrh of the nasal cavities. In children, vaccines were seldom used, for Mackey soon learned that chronic catarrh in children is due to adenoids and can be cured by the surgeon. It is an error to think that a child who breathes comfortably through the nose, can not have adenoids. Summing up the results as fairly as possible, he believes that in half of the cases treated by vaccines the catarrh was cured, that in many of the other cases the patients were pleased and grateful and considered themselves cured, but still had the same germs in their nose, so that after two or three years the catarrh will reappear, and that in one-third of the cases the catarrh persisted in a modified degree.

The cases treated by him may be divided clinically into three main groups: (1) Cases of frequently recurring acute attacks of nasal catarrh, leaving the patient apparently free from catarrh between the attacks—these persons are usually carriers; (2) cases in which the chief complaint is the incessant nasal catarrh; (3) cases in which post-nasal catarrh, though the patient is unaware of its existence, is the focal infection, maintaining chronic or recurrent bronchitis, sometimes associated with asthma, chronic gastric catarrh, neuritis, arthritis, nephritis, myocarditis, neurasthenia, spells of mild pyrexia, etc. The author considers nasal infections commoner than pyorrhea and much more important.

To be successful in this form of treatment, it is essential, in the first place, to know something of the bacteriology of the normal nasal capacity. Compared with the pharynx the healthy nasal pharynx is wonderfully sterile—at least that part of it which can be reached by a nasal swab. In health, cultures are sometimes quite sterile, but more often show a few odd colonies of *Staphylococcus albus* and diphtheroid bacilli. Hence, we should be very chary of accepting these as causal in case of catarrh. For some years the author has refused to make vaccines from them alone. In catarrh, almost invariably a profuse growth is obtained of *Pneumococcus, B. influenza, Micrococcus catarrhalis,* Friedländer's bacillus (*B. mucosus capsulatus*), or a special type of streptococcus. The author has never obtained good cultures of the pneumococcus and influenza bacillus from healthy nasal passages. On the other hand, it is quite common to find a person with post-nasal catarrh who is unconscious of the fact, though greenish muco-pus can be seen trickling down from his naso-pharynx.

Technique: Having ascertained that the patient has not recently used an antiseptic nasal douche, a nasal swab is passed along the floor of the nasal passage, till it reaches the back of the nasopharynx, is moved about a little, and then withdrawn in such a way that it rubs against the turbinate bone. Having swabbed the other side in the same way, two plates of blood agar are immediately inoculated and placed in the incubator. A nasal swab is made like a throat swab, but is much smaller and on much finer wire, so that it follows any twisting of the nasal passages without hurting the patient.

It is of the utmost importance that the culture should be put on and incubated as soon as the swab has been taken; and that, if this is impossible, the swabs be kept warm (for example, in the waistcoat breast pocket), until they can be taken to a laboratory. Delay of a few hours may spoil the cultures. Pneumococcus and *B. influenzae* die quickly if the swab gets cold, while germs of minor importance such as staphylococci and diphtheroid bacilli, actually multiply in the mucus on the swab and become more abundant as time elapses between the taking of the swab and the making of the cultures.

Mixed vaccines should be made when two or more catarrhal germs grow profusely on the plates; or when, as sometimes happens, a different infection is found in the two nasal passages. In doubtful cases, it is best to insist on repeating the test before preparing the vaccine.

The vaccines are best made of such strength that twenty minims represent the maximum dose, which in case of pneumococcus and streptococcus might be a 150 million for an adult, and of other germs 300 or 400 million. One begins with four or five minims and gradually increases, giving twelve doses at intervals of a week. The treatment should be continued over a considerable period, however rapidly the patient may appear to be cured.

Passive Immunization.

Antitoxin Dose in Diphtheria. Alfred Treacy[4] regards time and large doses as the two most important factors for recovery.

While no definite single rule can be laid down for the amount of antitoxin to be used in all cases, as a general rule doses should be given ranging from 15,000 to 35,000 in children up to fifteen years, and from 20,000 to 40,000 or 60,000 in older ones and adults. No baneful results followed the use of these large initial doses, except an occasional serum rash, which shortly disappeared.

For immunizing purposes, the dose ranges from 500 to 1,000 units for children, and 1,000 to 6,000 units for adults. It is usually, like the dose for curative purposes, given in one injection in the thigh at the upper outer aspect.

Antitetanus Serum in Military Practice. The Tetanus Committee of the British War Office[5] publishes an interesting diagram reproduced here (Fig. 16), which represents the ratio of cases of tetanus to the number of wounded soldiers treated in home military hospitals from August, 1914, to March, 1919. The abrupt fall in the ratio, in November, 1914, was without doubt due to the introduction of prophylactic injection of antitetanus serum. The probable reason for the diminished incidence of the disease as the war went on is earlier and more thorough surgical treatment.

While the prophylactic value of the antiserum is now firmly established, clinical and experimental evidence goes to show that, within about ten days, immunity brought about by an injection has already begun to fade, and that it, thence forward, declines steadily. Hence, it is advised that four prophylactic injections be given

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(4) New York Med. Jour., June 8, 1918.
(5) Brit. Med. Jour., July 5, 1919.

to every wounded soldier at intervals of seven days. It is also recommended that the primary prophylactic dose of antitetanus serum be changed from 500 to 1,500 units.

In acute general tetanus, the antiserum has been administered in large doses and at the earliest possible moment by the intrathecal route, repeated on the following day, combined with and followed on succeeding days by subcutaneous and intramuscular injections. The best results were obtained from very large doses of serum. From analyses of the figures in the last two series of 100 cases treated in the hospitals no case can apparently be made either for or against the intrathecal route. In each of these two series, one patient did not receive treatment with antetanus serum, and died. Of the ninety-nine patients in each series who received this treatment, seventy-four recovered and twenty-five died.

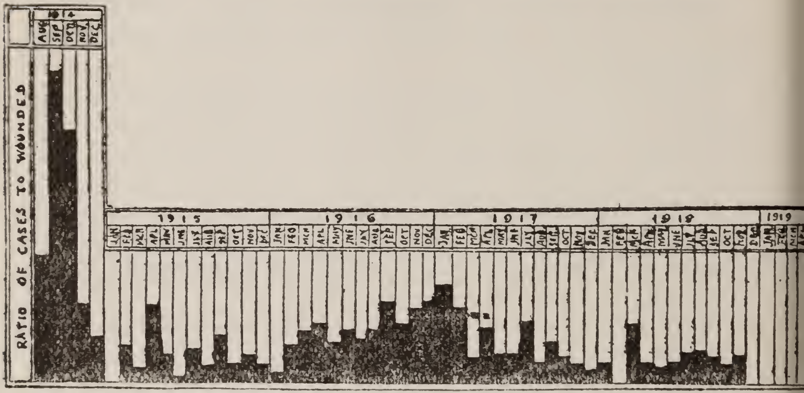

Fig. 16. Incidence of cases of tetanus per 1,000 of wounded.

PYRETOTHERAPY.

The word "Pyretotherapy" was devised by K. Titus (1918) to describe treatment by raising the temperature of the body. It is evidently a form of non-specific active immunization.

Reports are sufficiently unanimous to make it obvious that a certain amount of benefit can be obtained in infections from the provocation of a protein reaction, no matter by which one of a number of various agents. The practical question that remains to be determined is how the desirable efforts can best be secured.

It is important for the practitioner to realize, in this connection, that this treatment is diametrically opposite to the customary antipyretic therapy. If a better reaction is obtained, when higher temperature is provoked, then routine depression of temperature by medicinal antipyretics is all wrong. We do not employ these agents in critical conditions. Is it rational to use them in conditions, such as influenza, which might become critical if a good reaction does not take place?

Bacterial Protein Injections in Influenza Pneumonia. Dudley Roberts and Edward G. Cary[6] found, during the early days of the recent pandemic, all therapeutic efforts, such as phlebotomy, hypodermoclysis and digitalization, futile in influenza pneumonia, and a few transfusions of blood from recovered patients followed by unsatisfactory results, and hypodermic administration of mixed influenza, pneumococcus and streptococcus vaccines in small doses negative. They began, therefore, the use of intravenous injections of mixed influenza vaccines, and found that good results were obtained when there was a definite reaction following the injection. The authors came to believe that they were largely dependent for results on a "non-specific protein" reaction. They felt, however, that the use of a vaccine made from the prevalent organisms was advisable for many reasons.

A saline suspension of heat-killed organisms was used, so that each mil contained 100 million influenza bacilli; 100 million pneumococci, Types I, II and III; 100 million streptococci and 100 million staphylococci. At the outset they used 0.5 mil as the initial dose; later they used 1 ml. as an initial dose, and regulated the succeeding doses by the amount of reaction. They were anxious to secure a sharp reaction, and the dose was in-

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(6) Jour. Amer. Med. Ass'n., March 29, 1919.

creased or held the same according to the character of the reaction secured.

The reaction is a chill about one-half hour after the injection followed in from one-half to two hours by a rise of temperature, always of short duration. This is followed by a fall of temperature, which may be only slight, but at best it is a crisis, reaching practically normal. When the temperature falls there is a definite improvement in the state of well-being. Patients severely ill are never made worse.

The results are unsatisfactory if the reaction does not follow the injection; the results are usually satisfactory if there is a sharp reaction, though these rules are not without exceptions.

In Series 1, with expectant treatment out of a total of eighty-six cases, there was a mortality of 31.2 per cent. (Fig. 17). In Series 2, treated with protein injections, out of a total of 200 cases, there were nineteen deaths, a mortality of 9.5 per cent. Furthermore, convalescence, as judged by the return of temperature to normal, came earlier in the protein injection series.

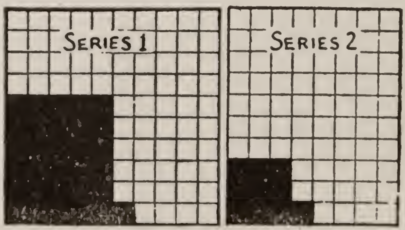

Fig. 17. Mortality (indicated by solid black): In Series 1 there were eighty-three cases with onset to October 5, and the mortality was 31.2 per cent.; in Series 2 there were sixty-seven cases with onset to October 5, and the mortality was 11 per cent.

Roberts and Cary believe that their results are due to injection of foreign protein which serves as a stimulus for the liberation of specific antibodies in animals in which the previously injected antigen was unable to cause such a liberation. In other words, while the therapeutic injection is non-specific, the antibody response is specific. Bacterial vaccines commend themselves because there is no danger of anaphylactic sensitization as is the case with many foreign proteins. The authors are inclined to believe that the procedure will come to be accepted as useful in a wide variety of infectious diseases.

Bacterial Filtrate in Treatment of Influenza Pneumonia. It is reported by Frederick H. Lamb and Edward B. Brannin[7] that it was discouraging to note the lack of effect from any of the usual therapeutic measures in influenza, when help was most urgently needed. It seemed that atropine was probably the most efficacious in producing an improvement, though temporary, in the cyanosis and dyspnea. No benefit from digitalis hypodermically or by mouth was ever demonstrated.

Foreign protein treatment with diphtheria antitoxin antimeningococcus, antitetanus and antipneumococcus serums was therefore instituted and, finally, the use of a bacterial filtrate prepared from the organisms commonly present in influenza and pneumonia, obtained from the laboratory of Dr. A. F. Schafer, Bakersfield, Cal., was undertaken.

Many cases, which appeared at the onset to be of the malignant type, would show an improvement (often unexpected), with subsequent recovery after the use of these proteins. However, no improvement resulted unless a reaction occurred. On the other hand, the same benefit was derived from the antimeningococcus, antitetanus and antidiphtheria as from the antipneumococcus serum, provided a satisfactory general reaction resulted. In other words, there was no apparent specific action of any type of serum, but the result was dependent entirely on its protein content. Early administration was essential to effectiveness. No harm, attributable to their use, was ever observed. From the use of serums there seemed to be a lessening of the hemorrhagic tendency. While an artificial crisis was desired and anticipated, more often, when benefit did result, it came as a gradual reduction in toxemia, in temperature and in respiration rate.

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(7) Jour. Amer. Med. Ass'n., April 12, 1919.

Of these products, the bacterial filtrate was unquestionably the most satisfactory. Its concentration, the sharp reaction produced, the ease of administration (from 0.5 to 1 c.c. intravenously being used as an initial dose), and the absence of disagreeable urticarial or arthritic sequelae, all being in its favor. The authors conclude that it was of no uncertain value in selected cases, though not by any means so much so as they optimistically felt in its inauguration.

Typhoid Protein Therapy in Influenza Pneumonia. David M. Cowie and Paul W. Beaven[8] report treatment of nine cases with intravenous injections of half-billion doses of dead typhoid bacilli. As a result of their experience, they advise that intravenous injection of typhoid protein is indicated only in the beginning stage of the pneumonia. The use of this method of treatment is contraindicated (*a*) in cases of influenza pneumonia advanced beyond the third day of the disease, or (*b*) when there is undoubted evidence of advanced myocardial insufficiency or acute endocarditis. No more than 500 million dead typhoid bacilli should be given at one injection. At least forty-eight hours should intervene before another injection is given.

The immediate effect of the foreign protein is the development of a typical protein paroxysm, which is followed by a marked decrease in the temperature and a definite improvement in the subjective symptoms, both of which are usually permanent. This is also a characteristic leukocytic movement. The increase is only of moderate degree. The effect on the pulse, respiration, physical signs and urine findings is practically negligible.

They conclude that an intravenous injection of typhoid vaccine may bring about a termination of the acute symptoms of the disease in from one to three days.

[In view of the fact that four of the nine patients died, the results could hardly be said to be brilliant. Still the impression of favorable effects obtained would make this method worthy of further careful trial.—ED.]

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(8) Jour. Amer. Med. Ass'n.. April 19, 1919.

Intravenous Injection of Modified Typhoid Vaccine in Influenza Pneumonia. The results from the intravenous injection of a foreign protein in eleven cases of influenza pneumonia are reported by C. Wells.[9] Nine of the patients were critically ill and presented a grave prognosis. Four of these died.

The protein used consisted of typhoid bacilli, macerated and exposed to the action of alcohol for twelve hours, washed free of alcohol and suspended in physiologic sodium chloride solution, the concentration being the equivalent of approximately three million bacilli per mil. The dose employed was, as a rule, 1 ml., sufficient to produce a definite, so-called protein reaction.

From thirty to forty-five minutes after the injections, the patients experienced a severe chill and moderate cyanosis, lasting from fifteen to twenty minutes. This was followed by a period of profuse sweating and marked elevation of temperature. Shortly after the sweating, the patients invariably felt and appeared much improved. In several cases, following the rise of temperature, there occurred a rapid crisis with no subsequent elevation in temperature, the patient going on to complete recovery.

The medical profession has long attached considerable prognostic importance to a high leukocyte count, particularly in pneumonia. Recognizing the occurrence of a low leukocyte count in the blood of a vast majority of the influenza pneumonias, it seemed logical, from the above point of view, to attempt to stimulate an increase of these cells in this condition. The occurrence of a leukocytosis following the injection of certain proteins has been demonstrated by many investigators. Of the eleven cases, eight showed, following the injections, an increase in the total number of leukocytes, only five, however, an increase worth noting.

Wells believes that the intravenous injection of foreign protein is efficacious in selected cases when made by one thoroughly conversant with all the possibilities of the therapy. Such injections, however, should not be employed as a routine by the general practitioner.

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(9) Jour. Amer. Med. Ass'n., June 21, 1919.

Leukocytosis After Vaccination with Army Triple Typhoid Lipovaccine. J. Wheeler Smith, jr.,[4] made daily leukocyte counts on eighteen healthy young men, for four days before the vaccine was administered, and for fifty-six days after vaccination. Figure 18 shows the salient features of the leukocyte reaction to this type of vaccination. There appear to be two periods of elevation of the leukocyte count, a primary rise, which occurs immediately after vaccination and which is followed by a gradual diminution in the white cell count over a period of five days. Then a secondary rise occurs, much less in degree than the primary but of very much longer duration. The primary rise is accompanied by a moderate polynucleosis. The depth of the following decline is accompanied by a mild mononucleosis. The secondary rise is unaccompanied by any change in the differential count.

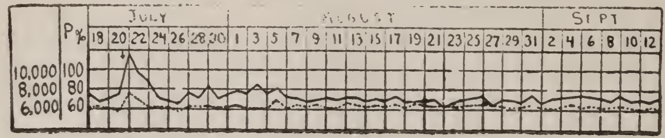

Fig. 18. Composite graphs of the eighteen cases, showing the daily average total leukocyte count (solid line) and percentage of polymorphonuclear neutrophils (broken line). Arrow indicates when vaccine was injected.

In the majority of cases, therefore, a vaccination with the lipovaccine leads to a polymorphonuclear neutrophil leukocytosis, of varying degree, over a period of approximately two weeks.

Typhoid Lipovaccine Lessens Susceptibility to Other Diseases. By experiments on mice, Edgar M. Medlar[2] arrives at the conclusion that there is no evidence that increased susceptibility to streptococcus inoculation is produced in mice following typhoid vaccination. There is a slight amount of evidence in favor of increased resistance to streptococcus, possibly due to the mobilization of the leukocytes. It is probable that these facts

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(1) Jour. Amer. Med. Ass'n., Jan. 25, 1919.
(2) Jour. Amer. Med. Ass'n., Dec. 28, 1918.

will be applicable to other vaccines and other diseases, for, in a series of thirty-two mice vaccinated against pneumococcus, similar results have been obtained.

The Therapeutic Value of Intravenous Injection of Human Plasma in Influenza. E. Lesné, P. Brodin and Fr. Saint-Girons[3] have experimented with the clinical value of convalescent's plasma, normal plasma and "autoplasma," *i. e.*, the individual's own plasma, and have arrived at the conclusion that they all act alike and that they are similarly beneficial in a considerable number of cases of infectious diseases, especially in influenza.

Generally, in from 15 to 60 minutes, a chill occurs, accompanied by headache and followed by rise in temperature of one to two degrees centigrade, even up to 41° C., and acceleration of pulse with fall in blood-pressure. After from 20 to 40 minutes, sweating sets in, the temperature falls rapidly to a point considerably below that which it had before the injection, and the patient commences to feel better.

In about half of the thirty-three cases treated, definite defervescence followed these injections; in about a fifth of the cases, temporary improvement occurred while in the remainder of the cases the effect was either minimal, very temporary, or *nil.*

The important fact brought out by these observations was the identity of the results, no matter what kind of plasma was employed. This proves that the favorable results could not be due to antibodies contained in the plasma—the theory upon which convalescents' plasma came to be used—nor that they could be due to immune bodies contained in the normal plasma, for even the patients' own plasma gave the same reaction.

It is evident, therefore, that the reaction must be due to foreign protein, into which even the patients' own blood proteins became converted when kept in contact with sodium citrate for a number of hours, and similar reactions may be obtained from the intravenous injection of distilled water, peptone, toxines, bacterial vac-

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(3) Presse méd., April 7, 1919.

cines, or any other substance capable of acting as an antigen.

The advantage of the plasma—and particularly the autoplasma—over most other antigens, is absence of danger of anaphylaxis or of other ill effects. Autoplasma presents the further advantage over the other form, of being easier to obtain.

The technique employed was briefly as follows: In a flask of 500 ml. capacity there are introduced 10 ml. of a 20 per cent. solution of sodium citrate. The flask is stoppered with cotton, through which is pushed a glass tube of large caliber, about 10 cm. long and also stoppered with cotton. The whole is sterilized by means of the autoclave. The blood is obtained from the elbow by puncture with a needle of rather large caliber and received directly into the glass tube of the flask. One must be careful to agitate the bottle while the bleeding is going on to promote mixing of the sodium citrate and the blood, to prevent clotting. The flask is kept at warm temperature for from six to twenty-four hours, the supernatant plasma is decanted aseptically by means of a syphon [or better by a sterile glass bulb suction apparatus—Ed.], and placed into sealed ampoules. It is filtered through sterile cotton just before use. Recently obtained plasma has given the same results as that kept for ten days or longer. Generally 100 ml. were injected, sometimes as much as 250 ml., quite often less, even as little as 40, which latter was the smallest quantity that produced a noticeable reaction. Some patients were injected repeatedly. All injections were made slowly, at low pressure.

Blood Transfusion in Influenza Pneumonia. T. L. Squier[4] reports two cases in which homologous citrated blood transfusion produced a severe reaction that was followed by a drop in temperature by crisis and by prompt recovery. On the other hand, two transfusions with immune blood which caused no reaction were followed by no change. Typhoid substance in two cases produced a typical protein reaction in each instance, a sharp fall in temperature and a dramatic improvement

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(4) Mich. State Med. Soc. Jour., June, 1919.

in the patient. These results have led the author to believe that non-specific protein therapy has a very definite and important place in the treatment of influenza-pneumonia.

Convalescent Blood and Serum in Treatment of Influenza Pneumonia. Henry F. Stoll[5] treated fifty-six patients suffering from influenza pneumonia, in 70 per cent. of whom the prognosis was poor, with the blood or serum of convalescent patients, with a mortality of approximately 45 per cent. Of twelve persons treated, within forty-eight hours after the development of the pneumonia, ten showed prompt improvement and recovered, while two died. Of thirty-two patients ill with pneumonia for an average of 3.9 days, when treated, 72 per cent. showed distinct improvement. Of twenty-four patients ill 5.4 days, when treated, 17 per cent. showed improvement.

His conclusions are that the transfusion of ''normal'' blood or serum is only exceptionally of value in influenza pneumonia; so is blood or serum from individuals vaccinated against pneumococcus. Convalescent influenza serum is probably less potent than convalescent pneumonia serum but of more value than ''normal'' serum.

The transfusion of blood or serum from convalescent influenza pneumonia patients is occasionally of value, even when used as late as the fifth day of the disease. When used early, within the first three days, a distinct improvement in all symptoms is to be noted in the majority of cases. It seems to lower the mortality, shorten the course of the disease, and diminish complications. The early employment of convalescent serum, therefore, appears to be a therapeutic measure of definite value.

Effect of Drug Fever Upon the Blood. Florence McCoy Hill[6] arrived at the conclusion that there is no alteration of note in the leukocyte count, nor any change in the protein quotient in ''aseptic fever'' in-

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(5) Jour. Amer. Med. Ass'n., Aug. 16, 1919.
(6) Jour. Pharm. and Exp. Therap., August, 1918.

duced by the intravenous injection of sublethal doses of fluid extract of ergot or of calcium lactate in rabbits.

These observations are of interest in suggesting that the usual blood changes occurring in fever might be due to some other mechanism than the elevation of temperature *per se*.

FUNCTIONAL THERAPY.

GENERAL PHARMACODYNAMICS.

Stimulants Increase, Depressants Decrease Oxidation. This is the conclusion that W. E. Burge[7] arrived at as the result of experiments in which animals under the influence of the drug were bled at fixed intervals after the administration of the substance and determinations of catalase made by adding 0.5 ml. of blood to diluted hydrogen peroxide, the resulting volume of oxygen being taken as a measure of the amount of catalase. As shown in Figure 19, the anesthetics, chloroform, ether, nitrous oxide, and magnesium sulphate (the latter given subcutaneously) decrease the catalase quite in proportion to the degree of their activity as anesthetics, while caffeine and theobromine increase the catalase. Further investigations show that the changes are partly due to influence exerted on the liver in the production of catalase and partly due to the effect on the catalase itself.

On the strength of this experiment, the author concludes that stimulation means increase in catalase with resulting increase in oxidation, and that depression means a change in the opposite direction.

A conclusion of the same nature has been arrived at by study of the metabolism of an isolated nerve, as shown by Shuichi Niwa,[8] who found that when the isolated sciatic nerve of the frog (Rana pipiens) is treated with cocaine hydrochloride solutions in concentrations which are not strong enough to anesthetize within a given time, it produces more CO_2 than the normal nerve. If, how-

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(7) Jour. Pharm. and Exp. Therap., November, 1918.
(8) Ibid., January, 1919.

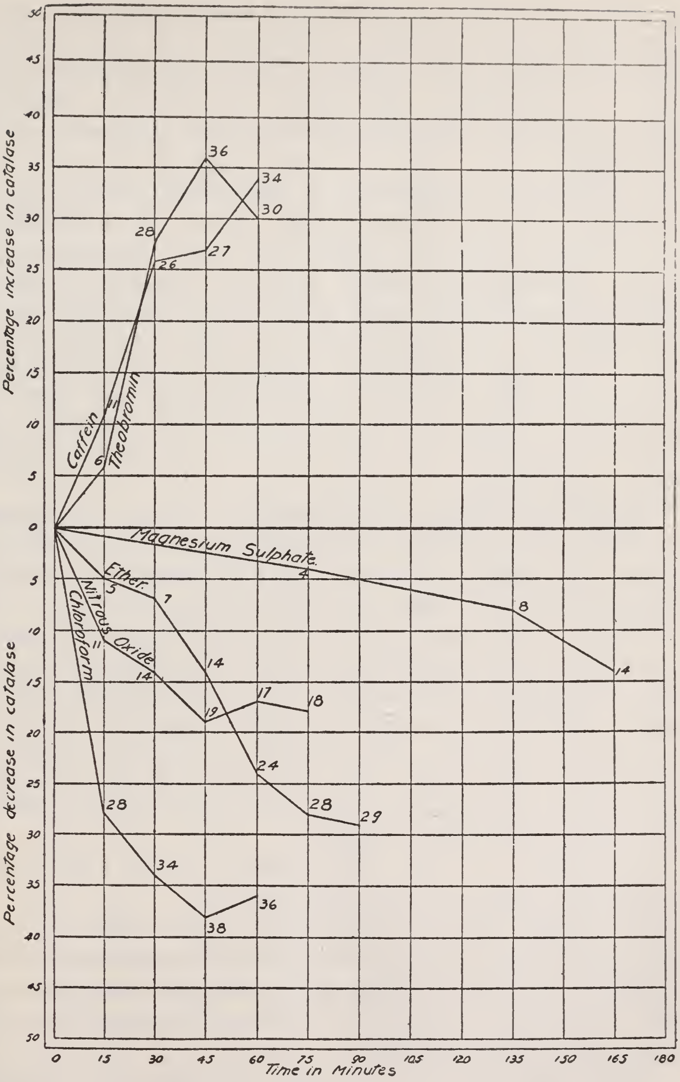

Fig. 19. Curves showing the percentage decrease produced in the catalase of the blood by the narcotics, and the percentage increased by caffeine and theobromine. (Article by Burge.)

ever, there are used concentrations which produce a state of complete but reversible anesthesia, the nerve metabolism is reduced to a varying degree depending on the depth of anesthesia. The longer the isolated nerve is treated with the drug, the greater is the decrease of the CO_2 output.

In general, the statement is supported that the local anesthetic, cocaine hydrochloride, affects the metabolism of the mixed nerve in exactly the same manner as do general anesthetics, namely, primary stimulation by a weaker concentration, and subsequent depression with diminution of CO_2 production by higher concentration. These facts demonstrate that there is a close relationship between the rate of nerve metabolism and the state of excitability of the nerve and suggest that anesthesia in general is probably brought about by interference with tissue metabolism.

Control of Hunger Contractions. Harry Ginsburg and Isidor Tumpowsky[9] studied, by means of the Carlson method, hunger contractions in gastric fistula dogs, some of whom had both vagi and splanchnics cut.

Atropine sulphate, in doses from 0.0008 to 0.0016 gm. hypodermically, invariably inhibited contractions and counteracted the effect of pilocarpine and eserine in this regard. The time of action is quite constantly between five and ten minutes. The inhibition is sudden, decisive, and persists for hours. The fact that the same results obtain in the "isolated" stomach indicates that the action is on the myoneural junction.

Pilocarpine, in doses from 0.005 to 0.012 gm. hypodermically augmented the contractions.

Eserine also produced stimulation, often after a long latent period, but activity remains as long as four hours. Inasmuch as similar effects were obtained on the "isolated" stomach, the belief is confirmed that eserine also acts on the nerve endings.

Cocaine justified its reputation of being able to allay hunger pains. Profound inhibition occurs with doses of 1 ml. of 0.5 per cent. solution of cocaine per kilogram hypodermically.

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(9) Archiv. Int. Med., November, 1918.

Camphorated oil, administered intramuscularly in large doses caused the contractions to become more frequent and intense and the period of activity more prolonged.

Strychnine, in doses of 0.00075 to 0.001 gm. subcutaneously, increased gastric tonus. There appears to be a definite increase in the hunger contractions themselves.

Administration of epinephrine causes prompt and marked inhibition of the hunger contractions, as was to be expected because of its property of stimulating the nerve endings of the sympathetic system. Inhibition also occurs with the "isolated" stomach.

Pituitary extract caused an effect remarkably like that of epinephrine. The action of pituitrin is of short duration.

Ergot, on intravenous injection, causes an increase in the spontaneous movements of the alimentary tract.

[The result of practical importance from this study is the experimental confirmation of the clinical observation that strychnine stimulates appetite and that cocaine deadens hunger pain. It is remarkable that cocaine can do so on hypodermic administration.—Ed.]

The Effect of Drugs on "Intestinal Gradient." The effect of a large number of drugs upon five segments of rabbit's intestine contained in the same beaker and recording their contraction simultaneously was studied by W. C. Alvarez.[1] The segments used were taken from the duodenum, upper jejunum, middle of small intestine, lower ileum and colon.

It was found that some substances stimulated all parts equally while others depressed all parts equally. The most interesting, however, were those which depressed or stimulated one end of the bowel more than the other. If, as Alvarez believes, the downward progress of material through the digestive tract is dependent upon a gradient of muscular activity, drugs which tend to steepen that gradient might act as purgatives, and drugs which tend to reverse the gradient might act as emetics. The following shows the results actually obtained by

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(1) Jour. Pharm. and Exp. Therap., October, 1918.

this experimentation in regard to the influence upon gradient:

Drugs Which Might Steepen the Gradient.

Markedly.

Adrenalin
Aloin
Carbon dioxide
Cascara
Magnesium chloride
Magnesium sulphate
Phenol
Sodium Citrate
Sodium phosphate (Na_2PHO_4)

Occasionally.

Apocodeine hydrochloride
Atropine sulphate.
Hydrogen peroxide
Sodium bicarbonate
Sodium chloride

Drugs Which Might Reverse the Gradient.

Markedly.

Copper sulphate
Digitalis
Ergot
B-Eucaine
Ipecac
Potassium cyanide
Potassium iodide
Potassium permanganate
Sodium potassium tartrate
Sodium salicylate

Occasionally.

Glycerine
Morphine sulphate
Nicotine
Zinc sulphate

In the first list will be found a number of well-known laxatives and drugs such as adrenalin and atropine, whose tendency to move the bowels is less generally known. In the second list, besides the well-known emetics, there are such drugs as digitalis, nicotine, morphine, potassium iodide and sodium salicylate, all notorious for their tendency to produce vomiting.

ALCOHOL.

The Pharmacology of Alcohol. Robert B. Wild[2] reviews the established facts on this subject as follows: Owing to its volatility it is an almost invariable ingredient of cooling lotions, when allowed to evaporate freely. When the alcohol is not allowed to evaporate, the vapor easily penetrates the skin and irritates the sensitive and highly vascular tissues beneath the horny

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(2) Lancet, Nov. 9, 1918.

epidermis. Its affinity for water causes it to harden the tissues. This property is used in astringent gargles and lotions. The most powerful antiseptic effects are produced, not by absolute alcohol, but by alcohol of from 40 to 70 per cent.

The reflex actions which follow the local application of alcoholic solutions, of a strength of 20 to 25 per cent. or over, to the mucous membrane of the lips, mouth, and pharynx, are rousing of the latent consciousness and an increase in the force and frequency of the heart and of the movements of respiration. These effects are of a very temporary character and pass off in about ten minutes, unless the alcohol is swallowed, when they may persist for half an hour, probably owing to the additional reflex from the mucous membrane of the stomach.

In dilutions up to 5 per cent. no deleterious effect is produced on the action of the digestive ferments, nor any hardening of the protein food. The activity of gastric digestion is increased: (1) by the action of the alcohol upon the mucous membrane of the mouth and pharynx, causing a reflex flow of saliva and gastric juice; and (2) by its local action upon the mucous membrane of the stomach, causing increased vascularity and a further flow of gastric juice. No matter how dilute a solution of alcohol may be, the alcohol will be partially vaporized at body temperature, and that part of the stomach unoccupied by food will contain a comparatively concentrated alcoholic vapor, which is a marked irritant to a delicate mucous membrane. This is the cause of the feeling of warmth in the stomach which usually follows the taking of even small quantities of alcohol. In concentrations over 5 per cent., alcohol delays digestion by interfering with the action of the digestive ferments and possibly hardening the proteins of the food, while strong concentrations set up an actual catarrhal inflammation of the stomach. In certain concentrations, alcohol acts like a volatile oil, regulates peristalsis, relieves spasmodic pain, and removes flatulence. With small doses, not sufficient to cause noticeable excitement, painful sensations are less acute and sources of mental worry, anxiety or irritation no longer occupy so large a place in the field of consciousness; there is consequently a feeling of euphoria or general well-being, and a tendency to drowsiness or actual sleep if the environment is favorable. It is this sedative influence which is often so valuable in dangerous and exhausting illness, and the judicious use of alcohol may suffice to turn the balance in a debilitated and despairing patient. This effect is obtained by small doses, and is not preceded by any indication of a preliminary stimulation, unless the drug is given in sufficient concentration to cause a temporary reflex effect. There is no proof from experiments that alcohol present in the blood in any concentration compatible with the amount given has any action on the heart or blood-pressure sufficiently marked to be of importance in therapeutics. In an exhausted or feebly-beating heart the addition of small quantities of alcohol to the perfusing fluid causes an improvement in the beat, and at the same time some of the alcohol is removed from the perfusing fluid, having apparently been utilized by the heart muscle as a source of nourishment. The improvement in circulation clinically observed in cases of exhausting disease is probably due to a similar action, combined with a sedative effect on the nerve centers which regulate the action of the heart, and also to a diminution of pain and anxiety.

The most marked effect of alcohol upon the blood-vessels is seen in the skin. The flushing is due to a paralysis of the muscular fibers in the walls of the small vessels which results in the capillaries being distended with blood. Alcohol is a cooling agent; the large amount of warm blood in the skin rapidly losing heat. When it is desired to increase directly the heat loss from the body and at the same time relieve congestion of internal organs and calm the nervous system, alcohol may be used as an antipyretic drug; but the danger, now so well known, of the use of alcohol before exposure to cold must never be lost sight of. Alcohol can replace a chemically equivalent amount of fat in the dietary up to 100 g. daily, and as 1 gm. of alcohol gives 7 calories, compared with fat 9.3 and sugar 4.1, as much as 40 per cent. of the carbohydrate needs of the body can be supplied by alcohol, and a still larger proportion in the case of a patient confined to bed. Hence, there can be no doubt that there are conditions of disease where its sedative action on the nervous system may be desired and where the digestive functions are in abeyance. Here a form of hydrocarbon of high caloric value, which requires no digestion, is quickly absorbed, and readily oxidized may be of very considerable value, and, on this account, alcohol may be preferred in such cases to other narcotics of greater potency, but which lack any nutritive properties.

For therapeutic purposes, Wild would place the dose at the equivalent of from 20 to 180 mils. of pure ethyl alcohol in the twenty-four hours. The alcohol can often be prescribed with advantage as 50 per cent. alcohol (proof spirit) made up like any other powerful drug in a mixture with such disguising agents as tincture of gentian compound, tincture of cardamom compound, tincture cinchona compound, or spirits of chloroform. It would be of advantage to the community, if all distilled spirits were looked upon and used as drugs only.

[The prohibition laws enacted in this country have declared alcohol a drug. The author's suggestion of prescribing pure alcohol with aromatic alcoholic vehicle seems a good one.—Ed.]

LOCAL ANESTHETICS AND ANALGESICS.

The Comparative Absorbability of Local Anesthetics from the Urethra. By introducing a known quantity of the anesthetic into the urethra of anesthetized dogs, leaving it there for a given period, then washing it out, and estimating the unabsorbed anesthetic, Torald Sollman[3] determined the absorbability of the hydrochlorides of the local anesthetics with the following result, expressing the absorbability reduced to cocaine 100:

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(3) Jour. Pharm. and Exp. Therap., March, 1918.

Apothesine and Beta Eucaine	86.6
Novocaine	97.6
Cocaine	100.0
Tropacocaine	105.0
Alypin	111.3

He found that the rate of absorption increases with the dose and concentration.

The absorption is most rapid in the first ten minutes, but continues quite markedly even after this time.

The absorption is not materially hastened by rendering the anesthetics alkaline.

Benzyl Alcohol: Its Anesthetic Efficiency for Mucous Membranes. Torald Sollmann[4] found that benzyl alcohol is a fairly efficient anesthetic for intact mucous membranes, greatly surpassing procaine; ranking about with alypin, beta-eucaine; and somewhat weaker than holocaine or cocaine. Its action is not as lasting as that of cocaine, and even 1 per cent. solutions produce considerable smarting. Applied to the gums the undiluted alcohol produces anesthesia in one minute which, after removal of the cotton by means of which it was applied, weakens to numbness in one and one-half minutes and disappears in about three minutes. With 1 or 2 per cent. solutions anesthesia was incomplete. On the tongue, a 1 per cent. solution does not produce satisfactory anesthesia, even after ten minutes' contact. A pledget of cotton dipped into the undiluted benzyl alcohol and inserted into the nostrils is painless and produces distinct but incomplete anesthesia; 2 per cent. solutions produce very incomplete anesthesia. Applied to the skin, benzyl alcohol produces but a very slight dulling of sensibility.

Allocaine S. a New Local Anesthetic. Seiko Kubota[5] having investigated the pharmacology of allocaine, arrived at the conclusion that it has many good qualities as a local anesthetic, but that, on the other hand, it has some unfavorable qualities. On account of the slight irritation produced by its acid solutions and by its precipitating action on tissue, its use is presumably limited.

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(4) Jour. Pharm. and Exp. Therap., July, 1919.
(5) Ibid., February, 1919.

General Spinal Anesthesia by Lumbar Injection of Procaine. V. Riche[6] considers procaine the best agent yet devised for the production of spinal anesthesia. It is three times less toxic as compared with anesthetic power than stovaine and six times less toxic than cocaine. The author, after extensive experience with this substance has devised a method for obtaining general anesthesia by spinal injection which he believes is likely to compete with general inhalation anesthesia in the surgery of the head, the neck, the thorax and the upper extremities. Success with this method depends upon the correct carrying out of the following technique: The dose to be injected should be calculated at 0.01 gm. per 5 kg. of the patient's weight. Thus an adult of 60 kg. would receive 0.12, one of 80 kg. 0.16 gm. The author employs an 8 per cent. solution, which he injects so slowly as to introduce 1 cg. a minute. He gives a subcutaneous injection of morphine and 2 ml. of 20 per cent. camphorated oil before the patient is sent to the operating room. With the patient lying on the side, the puncture is made in the second, or still better, the third lumbar intervertebral space, from 15 to 25 ml. of cerebrospinal fluid, according to its tension, are permitted to escape. The injection is then made as previously stated; and, to facilitate the diffusion of the solution throughout the cerebrospinal fluid, it is aspirated several times with a syringe during the course of the injection. The author considers this detail of the technique most important. When the injection is finished, the patient is laid on his back with his head low, and general anesthesia will be found to exist or will develop within a few minutes. This anesthesia lasts for from half an hour to an hour and a half.

Among about sixty cases in which the author applied this method in only four was the general anesthesia incomplete in that it did not pass above the clavicle; exceptionally (in three cases), transient respiratory trouble was noticed. More frequently (in 30 per cent.) vomiting sets in at about the end of the anesthetic period. At the same time a diminution in the frequency of the

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(6) Presse méd., April, 1919.

pulse, which may become slower even than 60 is noticed. It became necessary two or three times to inject 0.25 gm. of caffeine.

In the majority of cases nothing abnormal occurs following this injection except a slight backache, which disappears on the second or third day. In 10 per cent. of the cases, the patient complained of headache. In some of these, the quantity of cerebrospinal fluid extracted was as high as 30 to 35 ml. Two patients had bilious vomiting lasting until the third day. In three patients urinary retention occurred for forty-eight hours.

Prevention of By-Effects with Spinal Anesthesia. E. Gracia[7] advises withdrawing the cocaine solution after its injection for spinal anesthesia, immediately after the analgesia is complete. It is not even necessary, he found, to wait for the conclusion of the operation, as the analgesia once installed does not seem to diminish when this is done. This simple withdrawal of the spinal fluid usually prevents or arrests all disturbances following such injections, but, if it should not, the spinal canal might be washed out.

A Satisfactory Nasal Spray. A spray solution that has been given a remarkably prompt relief in acute inflammation of the nose of the following formula is given by John A. Thompson:[8]

	Gm.
Atropine	0.03
Epinephrine	0.06
Menthol	1.50
Camphor	0.75
Oil of sweet almond	60.00
Liquid petrolatum	180.00

Mix and dissolve.

Triturate the menthol, camphor, epinephrine and atropine in a mortar, until they liquefy. Continue trituration for some time after liquefaction "until the mortar rings." Add the mixed oil of sweet almonds and liquid petrolatum very slowly, with constant stirring. Bottle and let stand for twenty-four hours with occa-

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(7) Gac. de los Hosp., Mexico, D. F., June 13, 1919.
(8) Jour. Amer. Med. Ass'n., Aug. 23, 1919.

sional shaking. Filter through a dry funnel into a dry bottle, and the preparation is ready for use.

Aloes as a Local Sedative. F. W. Cook[9] reports that a saturated solution of aloes in tincture of tolu is, so far as he knows, the only thing that relieves the virulent itching of harvest bug bites. It should be kept in a stoppered bottle, shaken before use, and applied by means of the stopper to each bite once or twice *before scratching;* the relief is great.

He advocates the use of tincture of tolu in bronchitis kettles instead of compound tincture of benzoin. Here, after the aromatic portion has volatilized, the peculiarly disagreeable odor of aloes persists, whereas the tolu remains pleasant all the time, and is at least as soothing and antiseptic as the friar's balsam.

ANTIPYRETICS.

Pertonal, a new Antipyretic. This substance, which is chemically p. acetyl-amido-ethoxy benzene, a close relative of acetphenetidin, was investigated by Douglas Cow.[1] The chief difference between it and acetphenetidin is its greater solubility (1 to 60) in water. It possesses approximately one-half the toxicity of acetphenetidin, and, as an antipyretic, it produces similar effects in doses approximately double those of acetphenetidin. The latter exerts a directly depressant action on the heart, which is actually stimulated by pertonal. Against an antipyretic ratio of two parts of pertonal to one part of acetphenetidin, the corresponding ratio for narcotic action is approximately 15 to 1.

In general, the action of pertonal is less abrupt and more prolonged than that of acetphenetidin. Both drugs are excreted mainly in the urine in the form of p. amidophenol and phenetidin. It appears that a larger amount of phenetidin and a correspondingly smaller amount of p. amidophenol is set free in the tissues by pertonal than by acetphenetidin. No evidence of methemoglobin formation has been found after per-

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(9) Brit. Med. Jour., Sept. 7, 1918.
(1) Jour. Pharm. and Exp. Therap., February, 1919.

tonal, whereas this change is often found after acetphenetidin. No evidence of oxalic acid formation after pertonal has been found, though this was specifically sought for. A range of therapeutic dose of from 10 to 20 grains or more is recommended; it is suggested too that the dose need not be repeated so frequently as the dose of acetphenetidin.

[The author's tracings show that pertonal causes a marked depression of blood-pressure in spite of its tendency to stimulate the heart. This depression is due to dilatation of peripheral blood-vessels. Hence, the effect upon the circulation is not markedly different from that of the other coal-tar antipyretics. Its narcotic action being slight, it probably has less analgetic action than acetphenetidin as well, which is after all the chief effect for which these agents are used.—Ed.]

BENZYL BENZOATE.

Action of Benzyl Benzoate. During the past four years, David I. Macht,[2] in an extensive and intensive pharmacologic study of opium, and more especially of the so-called ''minor'' opium alkaloids, found that the minor opium alkaloids can and do modify the effects of morphine very markedly, and that important differences exist in the effects of opium alkaloids on smooth muscle. In respect to their action on these, they can be divided sharply into two classes: the pyridine-phenanthrene group, of which morphine is the principal member, on the one hand; and the benzyl-isoquinoline group, of which papaverine is the principal representative, on the other. The morphine alkaloids stimulate contractions and increase tonus, while the papaverine alkaloids inhibit contractions and lower tonicity. Further analysis of the interesting peripheral action of the opium alkaloids on smooth muscle revealed that the inhibitory and tonus-lowering actions of papaverine and the other members of the benzyl-isoquinoline group are to be ascribed to the presence of the benzyl grouping in their molecules. These observations led to the surmise that possibly the

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(2) Jour. Amer. Med. Ass'n., Aug. 23, 1919

inhibitory and tonus-lowering effects of papaverine might be produced by the exhibition of a benzyl grouping in some simpler form, and it was found that benzyl benzoate and benzyl acetate both actually produced the same pharmacologic effects as those of the opium alkaloid papaverine, and that they were much less toxic than papaverine.

Macht claims that the following clinical conditions were treated with benefit by means of benzyl esters: intestinal colic and enterospasm, both of a post-operative and other character; pylorospasm, whether of functional character or produced reflexly by ulcers and neoplasms; excessive peristalsis of the intestine, such as in diarrhea and dysentery, even when of long standing; spastic constipation; biliary colic; ureteral or renal colic; vesical spasm of the urinary bladder; spasmodic pains originating from the contractions of the seminal vesicles; uterine colic; bronchial asthma; arterial spasm, in which the administration of benzyl benzoate by mouth markedly lowered the blood-pressure, both the systolic and the diastolic, the effect being more lasting than that produced by the administration of nitrites.

A number of cases of coronary spasm (angina pectoris) seemed to be benefited by the benzyl treatment. The rationale of the treatment in all the cases is fundamentally one and the same, namely, that it is the inhibitory and tonus-lowering or spasm-relaxing action of the benzyl radical on smooth muscle that is desired.

Benzyl Benzoate in Bronchial Asthma. David I. Macht,[3] reports that, of over 150 cases of bronchial "asthma" treated with benzyl-benzoate, 75 per cent. were benefited. The drug was administered in most of the cases by mouth in 20 per cent. alcoholic solution, of which from 15 to 25 drops were given in cold water three or four times a day. A number of cases failed entirely to react to benzyl treatment. This is not surprising, when the dyspnea is due to other causes than the bronchial spasm. Only those cases of asthma may be expected to yield to the effects of the drug which are characterized by a spasm of these structures.

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(3) Southern Med. Jour., July, 1919.

Use of Benzyl Benzoate in Dysmenorrhea. C. Litzenberg,[4] reports satisfactory results from the use of a 20 per cent. emulsion with acacia in aromatic elixir of eriodictyon of which from 1 to 2 drams were given every two hours. Of forty-three patients, thirty-five, or 81.3 per cent., were relieved of pain. In twenty-seven cases, or 62.7 per cent., the pain was completely stopped, and in eight cases, or 18.5 per cent., the suffering was greatly relieved, but not entirely eliminated.

While atropine produces its antispasmodic effect by paralyzing the autonomic nerves supplying unstriped muscle, the benzyl esters seem to *act only on the muscle cell itself.*

DIGITALIS.

Heroic Dosage of Digitalis is advocated by Alfred M. Wedd,[1] who administered a daily dose of from 8 to 12 ml. of tincture of digitalis, and continued it until definite evidence of digitalis action was noted. The indications to discontinue the drug were alimentary disturbances, derangements of the cardiac mechanism or slowing of the pulse rate to a level beyond which it was deemed inadvisable to continue.

He found that successive tinctures supplied to the hospital wards showed marked variation in their efficiency. Two biologically standardized tinctures of approximately theoretical strength were studied and even their efficiency varied.

The toxic dosage showed marked individual variation, from 20 ml. to 100 ml. The earliest signs of toxicity were slight nausea and premature beats. The author believes it to be a perfectly safe procedure and one which will promptly bring about the expected benefits of digitalis to begin with an initial dose of 5 ml. of tincture and to continue with 8 or 10 ml. daily until signs of toxicity appear or until clinical improvement warrants discontinuing the drug.

Of the various changes in the electrocardiogram, al-

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(4) Jour. Amer. Med. Ass'n., Aug. 23, 1919.
(1) Bull. Johns Hopkins Hosp., May, 1919.

teration in the T-wave was the earliest and most constant. Modifications of the P-wave in the third lead in about one-third of the cases was noteworthy. Definite prolongation of the P-R interval, indicating increased conduction time, was seen in 80 per cent. of the cases. In two cases complete dissociation occurred and in one atrial tachycardia with high-grade block; in all these, normal mechanism was promptly restored by atropine.

Wedd believes that in all cases the action of digitalis is both central, in the medulla, and local, in the myocardium, with relatively greater local action in atrial fibrillation. He does not agree with the statement of Cushny that in fibrillation there is no digitalis action through the inhibitory mechanism; and suggests that the decrease of maximum rate after atropine of the digitalized heart may be taken as a measure of the local action of digitalis on the myocardium.

In the series studied were cases with all possible valvular defects, all grades of decompensation, renal lesions of varying degrees of severity, systolic blood-pressures ranging from 90 mm. to 230 mm., and almost all of the recognized types of myocardial involvement, including cases of intraventricular block, bundle branch block and complete dissociation, and there was not found any clinical entity which might be said to constitute a contraindication to the use of digitalis.

Use of Digitalis in Cardio-Renal Disturbances. O. M. Layton[3] warns us that the cardiorenal patient should not be sent out of the office with a prescription for digitalis. If he needs digitalis he has about used up his cardiac reserve, and digitalis is a mortgage on his heart; and, if he is permitted to go about without first making every possible effort to replenish his reserve, you have attached a second mortgage without any precaution for meeting the first. He should be confined to his bed or home until he is able to make a new start. We must not expect the impossible of this drug.

Digitalis has been given in too small doses. If the patient is in bed there is no danger in large doses given to physiologic effect. Intramuscular and intravenous

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(3) Wisconsin Jour., April, 1919.

routes should be oftener used in cardiorenal conditions to obtain immediate results. Oral administration may be used as soon as conditions warrant it.

Digitalis can be expected to influence edema only to the extent of its beneficial effect on the heart. The chemical factors involved, such as sodium chloride retention, toxemia and renal insufficiency must be dealt with independently. If the heart needs digitalis we may safely disregard the existing hypertension.

DIURETICS.

Mode of Action of Theophyllin in Acute Nephritis. It is suggested by E. H. Mason[4] that theophyllin probably acts in part by lowering the chloride threshold, thereby allowing the chlorides to pass out of the blood plasma, water following. He formulates this hypothesis on the strength of the observation in a case, in which 1 gm. of theophyllin (theocin) was followed by marked diuresis lasting for two days, simultaneously with this the level of the chloride threshold dropped.

In another case, in which 1 gm. of theophyllin produced no diuresis, the chloride threshold was slightly raised.

Following up this suggestion, he tried the action of theophyllin on normal and pathologic kidneys with results that seem to indicate that the drug acts on the chloride threshold, allowing the chlorides to pass out of the blood-stream.

In no case in which diuresis was not obtained was there a lowering of the chloride threshold.

EPINEPHRINE.

The Effect of Epinephrine on the Gastro-Intestinal Tract. In a review article of recent literature on this subject, Leon Binet[5] calls attention to the fact that the digestive tract is affected by epinephrine quite as profoundly as the circulation, though the former action is not so generally appreciated.

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(4) Archiv. Int. Med., February, 1918.
(5) Presse méd., August, 1918.

This is evidenced by the fact that experimental total extirpation of the suprarenal glands is followed in about 90 per cent. of cases by gastric ulcers, which may appear within twenty-four hours and which seem to be connected with submucous hemorrhages which occur within ten hours, and with gastric hyperacidity. It is impossible to decide at the present time whether this is a specific effect of suprarenalectomy or due to reflex disturbances consequent on operations in the splanchnic area. Binet cites a number of observations in human beings in whom gastric ulcers seemed to be connected with suprarenal disease.

Epinephrine cause constriction of the blood-vessels of the entire digestive tract with the remarkable exception of the lips, which become redder under its action. This effect, like all other changes produced by epinephrine, is due to stimulation of the sympathetic innervation, which, in case of the lip, produces vasodilation. The vasoconstriction has been utilized therapeutically in the treatment of hematemesis, intestinal hemorrhages and hemorrhoidal bleeding. However, there is danger that the great rise in blood-pressure produced by epinephrine might in certain cases increase the bleeding.

While the effect of this substance on the other secretions is not well established, all experimenters agree that gastric secretion of HCl is increased, reaching its maximum within the first hour, to fall below the initial titer within the next half hour.

The intestinal musculature is extremely sensitive to epinephrine, being inhibited in its contractions by doses of epinephrine that do not as yet affect the blood-pressure. Larger doses, on the other hand, cause stimulation of the intestinal muscle.

Binet calls attention to the demonstration by E. Lesne and L. Dreyfus of the fact that rectal administration of epinephrine is quite as toxic to animals as hypodermic injections of the drug; while, on the other hand, oral administration is quite devoid of effect, as is illustrated for instance by the failure of 35 mils. of 1:1,000 solution of epinephrine to produce any effect in an attempt at poisoning in man. The reason for this difference in toxicity is best understood, if we realize that this principle is rapidly destroyed by the liver, and that, by reason of the rich anastomoses of the hemorrhoidal vessels with the inferior vena cava, some of the epinephrine given by rectum escapes destruction by the liver.

Influence of Ether, of Hemorrhage, and of Plethora on the Pressor Effect of Epinephrine. Peyton Rous and George W. Wilson,[6] on the basis of experiments on rabbits and dogs, arrive at the conclusion that ether anesthesia has a marked influence in diminishing the pressor response to minute amounts of epinephrine injected directly into the circulation. Hemorrhage also lessens or abolishes the response, and to a degree directly proportional to the lowering of the blood-pressure it causes. The response to large doses, on the other hand, is uninfluenced by ether or hemorrhage.

These facts have a practical bearing not only on the employment of epinephrine to tide over collapse, but on its possible utilization to raise a low blood-pressure to the normal height and maintain it during a considerable period. For the amount of the epinephrine which under normal conditions will suffice to bring up the blood-pressure may have little or no effect on an etherized individual or on one who has lost blood.

In animals rendered plethoric by transfusion, the response to small doses of epinephrine lessens in proportion as the blood-pressure is increased by the plethora.

Synergism of Thyroid and Epinephrine. In 1916 Robert L. Levy[7] pointed out that in the cat, after inducing secretory activity in the thyroid gland, either by stimulation of the cervical sympathetic nerves or by injection of small doses of epinephrine, there can be demonstrated an increased effectiveness of epinephrine as a pressor agent. This effect is manifest only after a latent period, which may vary from about forty to sixty minutes and which is of considerable duration, having been observed for as long as seven hours. He undertook the present investigation to determine whether thyroid secretion affected the responsiveness of vagus

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(6) Jour. Exp. Med., February, 1919.
(7) Archiv. Int. Med., February, 1918.

terminations or rendered more excitable the sympathetic structures acted on by epinephrine.

His experiments render it evident that, when there has been a pouring out of thyroid secretion, there is no significant alteration in depressor effect or duration of cardiac inhibition following stimulation of either vagus nerve.

It is clear, therefore, that after the thyroid gland secretion sensitizes the sympathetic structures acted on by epinephrine in raising arterial pressure, there is no demonstrable effect on the excitability of the endings of the cardiac vagus.

The Antagonistic Effect of Epinephrine and Hypophysis Extract Upon the Bronchi. B. A. Houssay[8] has demonstrated by means of experiments upon dogs and guinea-pigs that extract of the posterior lobe of the hypophysis causes bronchial constriction, while that of the anterior lobe is devoid of this action. The experiment is carried on by means of rhythmic inflation of the lung during which the stationary chest wall is used as a lung plethysmograph, that is, a writing apparatus is connected by means of a tube inserted into the chest wall in such a way that the pulmonary excursions are recorded. During this experiment, the animal is curarized in order thoroughly to immobilize the chest. Following an injection of hypophysis extract, the insufflation becomes difficult or impossible. Epinephrine, on the other hand, possesses an antagonistic action, producing bronchial dilatation. Atropine is capable of diminishing the broncho-constrictive action of hypophysis extract, and in sufficiently large doses to annihilate it.

In connection with these observations upon the animal, the author calls attention to an observation by Lanari, 1913, upon an asthmatic in whom a typical asthmatic attack was produced on two different occasions by this substance, which were stopped by the action of epinephrine. The author knows of two analogous cases. Houssay can not understand, therefore, successes with hypophysis medication in the treat-

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(8) Presse méd., Oct. 7, 1918.

ment of asthma claimed by a number of authors. Nor does he believe that there is any advantage in combining epinephrine with hypophysis in the treatment of asthma, as has been advocated by Bensaude and Hallion (1918). The intense broncho-dilating action of the epinephrine easily arrests the feeble constrictive action of the hypophysis, so that the action of the epinephrine alone is manifest.

The only justification for employing such combination is in local applications to the nasal fossa, as it produces a more intense and more resisting ischemia than if either substance be applied separately. Hypophysis extract, reinforces and prolongs the vasoconstricting action of epinephine. On the other hand, it has an antagonistic effect on the bronchi, intestine and pupils.

The Effect of Drugs Upon the Output of Epinephrine from the Adrenals. G. N. Stewart and J. M. Rogoff[9] studied epinephrine output by means of effect of the blood upon intestinal and uterine strips of a rabbit. They found that *strychnine* causes a marked increase in the output of epinephrine from the adrenals (in the dog and cat). Although it is only by chance that a sample of adrenal blood corresponding to the maximum increase can be collected, outputs ten times the original amount have been observed.

The increase is not transient but persists for a considerable time. No attempt was made to continue the experiments until it had completely subsided, as it was not thought that any useful purpose could be served by keeping the animals, after the necessary operation, several hours under the anesthetic. The last adrenal sample was usually taken an hour to an hour and a half after the strychnine injection and it was the rule to find that this time the epinephrine output was still notably augmented. Indeed, with the smaller doses the effect may go on increasing during the whole experiment and the last specimen may correspond to a rate of output as great as or greater than that of any previous specimen. Abundant evidence has been produced in other papers that animals under similar experimental

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(9) Jour. Pharm. and Exp. Therap., May, June, July, 1919.

conditions, but without strychnine, do not show an increased epinephrine output.

No attempt was made to fix a minimum effective dose but it was clearly shown that doses of strychnine well within the therapeutic range, and which caused little or no exaggeration of reflex excitability are capable of producing a considerable augmentation in the rate of output. In this connection it must be remembered that the animals were necessarily well anesthetized, and it is to be supposed that still smaller doses would suffice in non-anesthetized animals.

Indications were obtained in some experiments that the stage of prolonged augmentation of the rate of output, which constitutes the principal action of the drug, may be preceded by a transient diminution. This phenomenon was best seen with the smaller doses and with subcutaneous administration of the drug, presumably because with the larger doses and with intravenous injection the augmentation of the output comes on so rapidly as to mask any preliminary decrease.

The augmentation of the output caused by strychnine is associated with a more or less marked increase in the epinephrine concentration, even when at the same time the rate of blood flow through the adrenals has been increased, a phenomenon not seen in the absence of the drug. But no evidence has been found that under the influence of strychnine the possible normal maximum concentration in the plasma (something like 1:500,000 as assayed by rabbit segments in adrenal blood from non-strychninized animals) can be exceeded.

In spite of the greatly increased output of epinephrine caused by strychnine, there was no evidence that the epinephrine store of the adrenals is distinctly diminished even by the prolonged action of the drug in large and repeated doses. The accumulation of epinephrine in the glands is therefore increased as well as the liberation. This is what happens during stimulation of the splanchnic except when intermittent stimulation is continued for very long periods. It corroborates other evidence that the strychnine effect is produced by an intensification of the secretory process through the nervous mechanism which normally governs it. There is no direct action on the glands.

[This study might explain the reason for the faith clinicians have in strychnine as a tonic and as a stimulant to the circulation.—Ed.]

The predominant and by far the most durable action of *nicotine,* whether administered intravenously or hypodermically, upon the epinephrine output is a depressant or paralyzing action. The maximum diminution of the epinephrine output is rather rapidly reached and then there is a more gradual recovery, which, when the dose is not too large, proceeds till the orginal output is approximately attained. At the time of maximum depression no epinephrine at all may be detected in the adrenal vein blood by the test object chiefly employed (rabbit intestine and uterus segments).

The depressant action is preceded by a transient stage of excitation, lasting as a rule in these experiments not longer than from half a minute or less to a minute. In this stage the rate of epinephrine output is markedly increased (from two or three to ten or fifteen times the original output or even more).

It may be pointed out that the nicotine effect on the epinephrine output is, speaking generally, the converse of the strychnine effect. The predominant action of strychnine is a marked and long-lasting augmentation of the epinephrine output. There are indications that the strychnine stimulation of the output may be preceded by brief depression. The nicotine action develops more suddenly than the strychnine action, as might be expected from the fact that the point of attack of nicotine is the efferent path, of strychnine the central mechanism.

The transient augmentation of the epinephrine output by nicotine may be associated with an increase in the concentration of epinephrine in the adrenal vein blood much beyond the maximum seen with the slowest blood flows in animals simply anesthetized (with ether, morphine or urethane). The strychnine augmentation of the output has not been observed to be associated with any increase in the normal maximum concentration.

Confirmatory evidence of the conclusions deduced from assays of the adrenal blood on rabbit intestine (and uterus) segments has been obtained by a method of auto-assay (collection of adrenal blood for a given time in a cava pocket and study of the blood-pressure reactions elicited when the blood is released from the pocket into the circulation) and by other methods.

Stewart and Rogoff have been unable to demonstrate any decided and constant effect of *strophanthin* upon the epinephrine output. Statements in the literature that the drug causes a marked augmentation of the output are based upon the use of inadequate methods.

The Suprarenal Gland in Influenza. J. H. M. A. von Tiling[3] observed several cases that presented almost the classical symptoms of acute Addison's disease, during an attack of influenza. The results of the administration of suprarenal gland substance, and especially of repeated injections of epinine and adrenalin chloride solution, were such that he became convinced that the extreme weakness seen so often in cases of influenza during the attack and also in the period of recovery was caused not so much by a weakened heart muscle as by adrenalin deficiency. Another observation of interest in this connection was the fact that a number of patients complained of a distinct localized pain and soreness in the region of the kidneys, after the general backache and headache had disappeared, and this backache was frequently very promptly relieved by epinine. It gave the impression that the administration of suprarenal substance or epinine had taken a load from the suprarenal glands.

In this connection it is interesting to note that Captain E. S. Winter[4] makes the following report: "In view of the marked decrease of blood-pressure in the majority of the cases of fatal bronchopneumonia, the suprarenals were specially examined at the 4th Northern General

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(2) Jour. Pharm. and Exp. Therap., July, 1919.
(3) New York Med. Jour., Nov. 23, 1918.
(4) Brit. Med. Jour., Dec. 7, 1918.

Hospital in three typical cases. Besides the morbid changes, commonly noted, the suprarenals were found to be much disintegrated by hemorrhages, which were most marked at the cortical medullary junction. Sections showed extensive hemorrhages throughout the three layers of the cortex, most marked at the cortical medullary junction, and extending to a slighter extent into the medulla; the cells showed marked cloudy swelling, and in many cells of the cortex there was a fatty change, as shown by staining with scarlet red.

[Unfortunately, general experience with epinephrine (or epinine, a synthetic product practically identical with it) has been disappointing in the circulatory asthenia of influenza.—Ed.]

HYPOPHYSIS.

Probably the most important contribution of the year to our understanding of the action of this gland, is that of Abel and Kubota, who believe they have proved that histamine is the active principle, responsible for its uterine and intestinal stimulant action. Their contribution is abstracted below.

Histamine. J. J. Abel and Seiko Kubota[5] have demonstrated the presence of histamine (B-iminazolylethylamin) in the hypophysis cerebri and have come to the conclusion that it is the plain muscle-stimulating and depressor constituent of the posterior lobe of the pituitary gland. As histamine occurs to some extent in all tissues, it can no longer be considered to be a hormone or substance specific to the pituitary gland. For the relatively high concentration in which this base is found in the posterior lobe, the authors have no explanation to offer. They believe that it is the essential, therapeutically active constituent of the hypophysis.

Histamine is a substance which stimulates plain muscle tissue in minute doses, which depresses the cir-

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(5) Jour. Pharm. and Exp. Therap. June, 1919.

culation, and which causes a shock-like prostration when administered in doses that lie beyond the limits of toleration. It is a widely distributed constituent of all animal tissues, organ extracts and enzymatic products, such as Witte's peptone and erepton, whether derived from animal or vegetable proteids. It arises wherever protoplasm is killed. While certain bacteria, as is well known, are capable of producing the base by decarboxylating histidine, its occurence as here described is entirely independent of microörganisms. Hydrolysis of pure proteins, such as crystallized albumin, pure casein and edestin, with hydrochloric acid yields a base which is identical, in the opinion of the authors, with histamine or which at best is a similarly acting substitution product of it.

It follows from the above that histamine is a constituent of our diet and that we daily consume no inconsiderable amount of the base, some of which is present in the form of the free base or a simple salt, while more of it is in all probability produced in the course of digestion. The authors base the latter assertion on the fact that enzymatic products, such as Witte's peptone and erepton, contain the base in larger amount than the original material from which these products are derived.

The authors present data to prove that the animal organism can tolerate considerable amounts of histamine when this substance is given by mouth.

Abel and Kubota suggest that histamine plays an important rôle as stimulant for the gastric and intestinal musculature and also as a dilator of capillaries during digestion. The last action is probably also of importance for organs in general, during periods of increased activity. It has also been suggested that histamine is the most powerfully acting among the depressant substances which have their origin in mutilated tissues, and hence plays the leading rôle among the chemical factors concerned in traumatic shock.

Use and Abuse of Hypophysis (Pituitrin). Anna E. Blount[7] believes that pituitrin has followed what might be called the usual symmetrical curve of faddism. First used to increase uterine contractions by Blair Bell and Hicks in 1909, the crest of the wave of pro-pituitary enthusiasm came about 1914 or 1915, and since then there has been a rapid recession.

Perhaps the best final summary of the results of pituitrin administration has been made by Joseph J. Mundell,[8] who collected reports on 5,245 cases. The first report, in 1914, covered 3,952 cases with one rupture of the uterus in every 494 cases and one fetal death in every 146 cases. He published the second batch of reports on 1,293 cases in 1916, with one ruptured uterus in every 106 cases, or nearly 1 per cent., and with one fetal death in every thirty-eight cases, and one case of asphyxia pallida in every thirty-two cases.

Blount ascribes the reason for the early reports being so much more favorable to suppression of unfavorable ones at a time when favorable reports on pituitrin were coming from all sides, as unfavorable ones would reflect discredit on the physician in whose practice they occurred.

The large percentage of fetal deaths may be attributed to compromising of the placental circulation by violent uterine contractions, also to premature placental loosening. Convulsions following birth in asphyxia are most common. Occasionally a contraction ring will strangle a child by closing on the neck.

When we add to the dangers from pituitrin, just mentioned, that terrible harvest of misery from deep cervical lacerations, Blount is inclined to question the advisability of using it in any case in which the risk involved is not already great. Such would be selected cases of placenta previa lateralis, premature separation of the placenta, and premature rupture of the membranes with infection. The other indication of primary inertia, with no obstruction is so rare that manufacturers would go out of the business of producing pituitrin for this anomaly. All cases of postpartum hemorrhage and Cesarean section after delivery of the child, and

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(7) Illinois Med. Jour., April, 1919.
(8) Jour. Amer. Med. Ass'n., June 2, 1917.

induced labor, after the bags have been introduced, may sometimes be suitable cases.

It probably should not be used in secondary inertia, for "if the natural forces of labor are unable to expel the child without assistance, their stimulation by the use of pituitary extract is not quite logical" for pituitary extract, while it may supply stimulation, can not supply muscular power, if muscular power is exhausted.

The contraindications are normal labor, primiparae, high blood-pressure, tumors, contracted pelvis, or any pelvic obstruction, incomplete dilatation of the cervix, and all cases of abnormal presentation.

It is, therefore, as we see, indicated either where it can be administered to the mother and not to the child, or where the risks to the child are already so great that it proves the least of possible dangers.

Blount calls attention to the fact that as a drug, pituitrin is unstable, uncertain and unsatisfactory. It is of varying strength and the individual reaction to it is always an unknown quantity. At times one may give two or three ampoules, with no result whatever, and at other times a few minims will threaten the rupture of the uterus, even with the usual indications fairly met.

Each person should employ some standard preparation and become familiar with its dosage. As it is dispensed in ampoules, the tendency is to give always too large a dose. A whole ampoule should *never* be given at one time. Three or four minims may be administered at a dose, repeated every half hour, getting results within four to six minutes, but with occasional cumulative effect. The effects of the drug are usually evenescent, lasting about half an hour, after which the dose must be repeated.

Kosmak[9] also believes that much harm has been produced by this substance. He cites cases in point. He is likewise convinced that 1 ml. is too large a dose; and that 0.3 ml. is sufficient.

Alcohol Has No Unfavorable Effect on the Activity of Liquor Hypophysis. To test the statement made

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(9) Jour. Amer. Med. Ass'n., Oct. 5, 1918.
(1) Jour. Amer. Pharm. Ass'n., October, 1918.

that traces of alcohol destroy the physiologic action of liquor hypophysis, Paul S. Pittenger[1] carried out experiments in two different ways. In some, the syringe was first washed out with alcohol after which the extract was drawn up into the syringe, and then immediately injected. In the rest of the experiments, a small quantity of alcohol was added to the extract and the solution allowed to stand one-half hour before injecting.

The results of eight experiments on the isolated uterus and of ten experiments on the blood-pressure show that in every case the effects were exactly the same.

MISCELLANEOUS.

Magnesium Sulphate Treatment of Burns. S. J. Meltzer[2] dipped both ears of deeply anesthetized rabbits in hot water (62.5° C.) for three minutes. Immediately afterward the right ear was submerged in a 25 per cent. solution of magnesium sulphate and the left ear in a 6 per cent. solution of sodium chloride for three hours. Figure 20 shows the condition sixteen days later.

On the left ear which had been immersed in the sodium chloride solution about one-third sloughed away and the stump was healing. On the right ear there was some sloughing at the tip, which was in the process of healing.

Meltzer obtained similar results in human beings. First and second degree burns are invariably arrested in their development when concentrated solutions of magnesium sulphate have been applied early. Third degree burns ran, as a rule, a more favorable course under application of $MgSO_4$ than under any other treatment. Higher concentrations than 25 per cent. seem to exert a still better influence. The favorable action of the application of $MgSO_4$ in advanced stages of burns of the second and third degree is less striking, especially on account of the infection present; but even in this stage it seems to exert a favorable influence and ought to be used either in combination, or alternatingly, with antiseptics.

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(2) Jour. Pharm. and Exp. Therap., November, 1918.

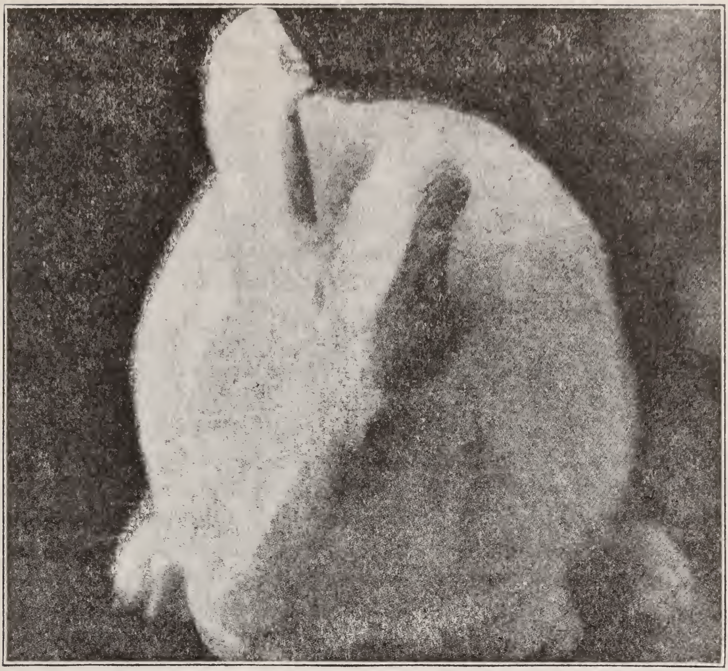

Fig. 20—Rabbit, 16 days after immersion of both ears in hot water and subsequent treatment of right ear by concentrated solution of magnesium sulphate. One-third of the left ear has sloughed away, while in the right ear there was only slight sloughing near the tip.

Salt for Seasoning in Salt-Free Diet. E. Jacobson[3] is attempting to do away with hyperacidity or hypersecretion, by shutting off the food supply of chloride. To season his food, the patient is given a special inorganic salt mixture of about the same proportions as found in milk, except that calcium lactate is substituted for cal-

	Gm.
Dicalcium phosphate	5–8
Monomagnesium phosphate	3–4
Dipotassium phosphate	7–7
Sodium citrate	7–4
Potassium citrate	1–7
Calcium lactate	4

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(3) Jour. Amer. Med. Ass'n., Nov. 24, 1917.

cium chloride. These salts are acceptable to patients with nephritis who are on a salt-free diet as seasoning in place of common salt.

The diet consists of fresh meat, potatoes, oat-meal, carrots, and cauliflower, cut fine and then boiled for hours with several changes of the water; stewed apples, prunes and apricots; very weak tea and coffee; butter freed from salt by washing fine particles thoroughly in running water; one egg and about 50 mls. of milk and cream per day, but no more. Distilled water is used for cooking if the chlorine content is low, as it is in Chicago.

The author is not yet ready to publish results.

Acridity of Some Plants Due to Crystals. E. D. Brown and D. D. Anderson[4] have shown that the so-called acrid taste produced by Indian turnip (*Arisaema triphyllum*) is due to nothing more or less than minute needle-shaped crystals which produce a sensation of tingling lasting for some time. They found similar crystals in skunk cabbage (*Dracontium*) and in phytolacca, to which the acridity of these plants is probably due. This would bring the peculiar local action of these drugs in line with the effect of cowhage (*Mucuna pruriens*) which when placed in contact with the skin causes intolerable itching, greatly increased by rubbing and depending entirely upon the penetration of fine hairs into the skin.

Prevention and Treatment of Sea-Sickness and Allied Conditions. Nathan Rosewater[5] recommends treating the patient fully for one or two days before sailing to forestall the nausea and vomiting. He does this by emptying the bowels and maintaining a constant preponderance of peristalsis to prevent the overbalancing of the peristalic forces by those of antiperistalsis, and endeavors to keep up that preponderance during the trip.

By means of a tablet of aloin, belladonna and strychnine, each night for two nights before going abroad, also one tablet of 1/60 grain of strychnine sulphate and one of 1/200 grain atropine sulphate one hour before meals 3 times a day.

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(4) Jour. Pharm. and Exp. Therap., August, 1918.
(5) New York Med. Jour., April 26, 1919.

The atropine and strychnine need not be given separately if the laxative tablet with belladonna and strychnine is reduced in strength so that it can be taken an hour before meals without too much cathartic effect.

The same treatment is also useful in car-sickness.

Uses of Menthol. It is suggested by F. P. Atkinson[6] that crystals be ground and kept in a tin box in the waistcoat pocket. All that is required is to wet the forefinger or little finger so as to get a small quantity of menthol to adhere to it, and then rub the inside of the nostril as far only as the edge of the cartilage. After this a forced nasal expiration should be made so as to get rid of any loose crystals, and in about a minute the air passage will feel quite free. There is little or no reaction as a rule.

In the treatment of inflamed sebaceous follicles, ground menthol should be rubbed in with a damp finger, and the inflammation will subside in from twenty-four to forty-eight hours.

In nasopharyngeal irritation strong peppermint lozenges are found particularly useful.

Musk in Influenza. Musk was used in influenza by Arthur Ransome[7] in the form of a pill, dose 0.06 gm., in combination with an equal quantity of quinine given every four hours. Shortly after the commencement of the treatment, he noticed a distinct improvement in the course of the disease, especially in the mortality from pneumonia.

Treatment of Influenza in Children. A. Jacobi[8] reminds us that in treatment of this disease in children one of the best stimulants, useful in the gravest of all cases which are attended with collapse and heart failure, is sadly overlooked among us, *viz.*, Siberian musk. He knows of nothing better in the most urgent of cases. A child of 2 years should take, of the 10 per cent. tincture, from 5 to 10 minims every half hour until half a dozen or a dozen doses have been taken. Musk, together with large, hot enemas, has led him over many a difficult pass.

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(6) Brit. Med. Jour., Oct. 19, 1918.
(7) Brit. Med. Jour., March 15, 1919.
(8) Med. Record, March 15, 1919.

These measures are not exclusive to influenza, but to all conditions of nerve exhaustion, no matter from what cause.

TOXICOLOGY.

ACETYLSALICYLIC ACID.

Acetylsalicylic Acid (Aspirin) Intolerance. Edmund P. Shelby[1] reports the case of a young woman who, forty-five minutes after taking aspirin (Bayer) in 5 grain capsule, felt an itching of the scalp. There was swelling of the hands, and white blotches appeared over the face and body. In a few minutes the eyes were swollen and closed and violent irritation of the larynx set in. The patient was unable to speak and obstruction of the larynx became so alarming that the question of tracheotomy for the relief of the laryngeal obstruction was considered. Half an ounce of Epsom salt soon brought on nausea and a small amount of liquid was vomited, after which the patient fainted. On her return to consciousness the rash began to fade, the breathing became less labored and the swelling of the eyes subsided. By three o'clock, two hours and forty minutes from the time she had taken the acetylsalicylic acid, the patient was fairly comfortable and could open her eyes and speak. A rapid return to normal followed.

A similar case is reported by W. A. E. Karunaratne.[2] A man, aged 32, was given 10 grains of aspirin in tablet form. An hour later, he was cyanosed, gasping for breath and unable to speak. The pulse was good, though somewhat rapid. This condition lasted about twenty minutes. An hour later, edema of the face, forehead and neck appeared; and became so marked that the patient could not open his eyes. Then an erythematous rash became visible over the face and upper extremities, some of which was still visible at the end of three days. There was a trace of albumin in the urine.

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(1) Jour. Amer. Med. Ass'n., Oct. 26, 1918.
(2) Brit. Med. Jour., July 12, 1919.

Patient had a similar series of symptoms after taking a small dose of aspirin two years previously.

R. T. Williamson[3] reports that he has seen cases similar to the ones above described and that in his cases the patients have taken soda water or an alkali after the aspirin. He advises his patients not to take soda water or alkalies after this drug.

Aspirin Habit. D. I. Macht[4] reports the case of a man suffering from chronic periostitis who, for the past two years, has been taking from five to twelve 0.30 gm. tablets of the drug—in other words, from 1.6 to 4 gm.—daily, with very little ill effect. The patient is obstinately constipated, has slight digestive disturbances, and a rather low blood-pressure.

ALKALIES.

Production of Tetany by the Intravenous Infusion of Sodium Bicarbonate. A case of fatal bichloride of mercury poisoning in which the patient, a woman, even though she had become totally anuric, was given 500 ml. of a 5 per cent. sodium bicarbonate solution intravenously is reported by G. H. Harrop.[5] This was prepared by boiling a sodium bicarbonate solution made up with freshly distilled water, and then reconverting the carbonate so formed into the bicarbonate by passing a stream of carbon dioxide through the solution until it was no longer colored by a few drops of phenolphthalein. No untoward effect was noted, and she said that she felt more comfortable afterward.

Twenty-four hours later, another intravenous infusion was given of 700 ml. of a 5 per cent. sodium bicarbonate solution, prepared as before. This made in all 60 grams. of sodium bicarbonate given intravenously. About five minutes after this last infusion, which had been given very slowly, and had been apparently well taken, the patient's face suddenly grew pale, she commenced to have great inspiratory difficulty, and became very appre-

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(3) Brit. Med. Jour., July 19, 1919.
(4) Medical Record, Nov. 2, 1918.
(5) Bull. Johns Hopkins Hosp., March, 1919.

hensive. She complained of numbness and tingling of the fingers, and begged to have them rubbed. The hands assumed the typical obstetrical position, there was pedal spasm, and a first degree facial phenomenon (Chvostek's sign) was obtained. The pulse was accelerated to about 130, and the extremities became cold. There was no elevation of the blood-pressure. The acute attack lasted for about fifteen minutes, after which the breathing became easier and she was less apprehensive. The *main d'accoucheur* position was maintained for about two hours. Trousseau's phenomenon was present for five days and Chvostek's sign was obtained for eight days.

Howland and Marriott have observed tetany in young children following the therapeutic administration of sodium bicarbonate for acidosis and cite three cases.

This case is cited to call attention to a danger, not too remote, attendant upon the intravenous use of sodium bicarbonate in conditions in which the renal excretory function is markedly impaired, and particularly when extreme oliguria or anuria is present.

ARSENIC.

Chronic Arsenic Poisoning. Samuel Ayres[6] reports the case of a woman, aged 22, who showed loss of weight, muscular weakness, disturbances of the tactile and other special senses, digestive disorders, sore mouth and tongue with salivation, menstrual disorders, especially periods of amenorrhea, painful conjunctivitis, dry and defective hair, painful urination, tachycardia, loss of appetite, headache, diffuse pain and tenderness, and dermatitis which had been general, but at the time of examination was limited to the face and consisted of a roughening with diffuse browning pigmentation. All the symptoms were worse in the winter or nearly spring.

The finding of arsenic in the urine, together with the fact that Paris green was kept in the house, and also that the wall paper contained arsenic explains the winter exacerbations of all symptoms. At this time the

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(6) Jour. Amer. Med. Ass'n., Dec. 28, 1918.

patient spent more time indoors, and the windows were more likely to be closed; hence, the greater opportunity to absorb arsenic vapors. Undoubtedly the patient became thoroughly poisoned with arsenic five years before, when she sprayed fruit orchards; and her illness had been prolonged by the subsequent absorption of small amounts of arsenic either from the box of Paris green or from the wall paper or from both.

The treatment consisted essentially in removing the source of poisoning and in treating the gastro-intestinal disturbances symptomatically, with daily colonic irrigations of sterile water and a light diet of cooked food. According to report a month later, the patient had improved markedly. The prognosis in this case is good because the peripheral neuritis has not progressed to an irreparable state.

BARIUM.

Barium Salt Poisoning. R. Bensaude and E. Antoine[7] point out that, while barium sulphate used as an opaque substance in contrast meals is harmless to man, while extremely useful for Roentgen work, fatalities have followed use of the carbonate or sulphide used by mistake in the place of sulphate.

They describe two fatal cases. A robust woman died ten minutes after ingestion of the suspension of 40 gm: of barium polysulphide. A man took 80 or 100 gm. of barium carbonate and vomited part of it the third hour. Though he was given sodium sulphate and magnesium sulphate, death occurred thirty-five hours later. A number of other accidents of this kind are on record.

BARBITAL.

Barbital Poisoning. P. Gautier[8] reports four cases of barbital poisoning, which he observed at the Canton Hospital, Geneva, during a few months, one of which was fatal. In one case, 75 gm. of barbital produced

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(7) Bull. de la soc. méd. des hôp., May 2, 1919.
(8) Rev. méd. de la Suisse romande, Nov. 20, 1918.

sleep for forty-eight hours and somnolence for four days; this was followed by recovery. Another patient, who took from 7 to 8 grams of this substance, slept for twenty-four hours, was in torpor for forty-eight hours and finally recovered. A dose of 3.5 gm. of barbital produced, in a third case, sleep which lasted thirty-six hours, somnolence sixty hours and was followed by recovery. In the fatal case, 5 gm. of barbital produced coma, and hyperpyrexia. Death occurred in the fourth day.

The first symptom found in this intoxication is sleep, which is so profound, that no external excitation can awaken the patient. Following this sleep the patient passes into a state of somnolence or torpor which may extend for a period of several days and which gradually becomes less marked. The patient is semi-conscious and responds poorly. The reflexes, tendinous as well as the pupillary, in slight intoxications are active, while in severe poisoning they are abolished. In severe cases, there is a miosis. A marked elevation of temperature is frequently observed in victims of this drug. In one of the cases observed, the temperature went as high as 41° C. This hyperpyrexia is not explained even by the findings of autopsy. The pulse is rapid in the majority of cases. The urine generally does not contain albumin. Inasmuch as from 60 to 90 per cent. of the barbital is excreted in the urine, the determination of its presence there might be of diagnostic importance.

The prognosis is, on the whole, favorable, as it takes large doses to produce death. Doses of from 10 to 12 gm. generally are followed by recovery. The fact of importance is the accumulation of barbital, which makes a person habituated to this hypnotic seem much less resistant to poison and liable to die from smaller doses. It is thus that the only death, in the series of cases reported, was from 5 gm. of barbital, while the other patients who had had 7 and 8 gm. recovered. The fatal case was in a barbital habitué, who, several days before the fatal intoxication, slept a whole day from a dose of unknown size. In a similar manner, another habitué slept for thirty-six hours after a dose of 3.5 gm.

Other authors report recovery with 10 gm. and more, while they cite death from 3 gm. in barbital maniacs.

The treatment is purely symptomatic; gastric lavage, if one arrives in time, caffeine, camphor, oxygen and injections of normal saline. The author insists that barbital should not be dispensed without a physician's prescription.

CAMPHOR.

Camphorated Oil Poisoning. R. W. Benz[9] reports an occurrence in which twenty children were given from 1 to 1½ tablespoonfuls of camphorated oil instead of castor oil. The doses were administered at 6:30 a. m., and the first child to be taken ill presented initial symptoms at 7:15 a. m. The children were sprawled all over the dormitory presenting all kinds of symptoms, from an expression of the face indicating nausea to convulsions.

The most severe case is described as follows, all the rest presenting the same symptoms to a minor degree: "The child was unconscious and rigid, with the head thrown backward. The color was good except for intense lividity of the lips, which were blue-black. The body was cold to the touch. No perspiration was apparent. The pulse was greatly accelerated (120), but showed good volume. Respirations were slow and shallow. No actual count was taken. The eyes were fixed staring straight ahead. The pupils were equally dilated. An odor of camphor was noticeable on the breath. The jaws were locked, and there was a tetanic contraction of the masseters. There was cervical rigidity. The arms showed tonic contraction. The legs were extended. The twitching of oral and bucal muscles was noticeable. The reflexes were not noted."

Treatment consisted of emesis induced by mustard water. The children more severely affected were immersed in hot mustard water, and when they became relaxed, which occurred within a few minutes, they were forcibly given mustard water. A cupful in practically

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(9) Jour. Amer. Med. Ass'n., April 26, 1919.

all cases was sufficient to cause emesis, aided with upward pressure of the abdomen. These patients were well within three or four hours, with the exception of one very severe case in which alarming symptoms continued for twenty hours, during which time the child was comatose. This child was well in twenty-nine hours.

CHLOROFORM.

Effect of Feeding Sugar Upon the Esterase and Ereptase Content of Blood Serum and Organs in Chloroform and Phosphorus Poisoning. An attempt to study the mechanism of the protective effect of a carbohydrate diet upon certain types of poisoning believed to be associated with increased protein metabolism, such as poisoning by chloroform and phosphorus was made by J. P. Simonds.[1] As it seemed probable that this protective action of carbohydrates was in some way dependent upon the intracellular enzymes, a study was undertaken of the effects of feeding sugar and of poisoning by phosphorus and chloroform upon the esterase and ereptase content of the blood serum and of extracts of the liver, spleen and kidneys, and of the proteolytic properties of these organs.

By experiments upon dogs, it was found that the protective action of the feeding of sugar manifested itself both clinically and histologically. The animals which were given only phosphorus became exceedingly ill and several died as a result of the poisoning. The livers of all of them showed absence of glycogen, marked increase of visible fat, and necrosis. The dogs which were given an equivalent amount of phosphorus with feeding of sugar showed little or no evidence of illness clinically and were always playful. None died as a result of the poisoning. The livers showed glycogen still present, and some visible fat, but no necrosis. This increased amount of glycogen in the liver is accompanied by a marked increase in the esterase and ereptase content of that organ.

It seems probable that the relatively small amount of

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(1) Jour. Exp. Med., Dec. 1, 1918.

visible fat present in the livers of the animals which were fed on sugar before and after poisoning with phosphorus is in some way closely related to the marked increase in the esterase content of the liver noted in these experiments.

Chloroform poisoning does not appear to reduce materially the ereptic power of the organs studied. Poisoning by phosphorus, on the other hand, causes a considerable decrease in the ereptase content of the liver; but apparently has little effect upon that of the kidneys or spleen.

Feeding sugar in large amounts for five or six days does not increase the ereptase content of the livers of normal dogs. It does, however, appear to prevent the decrease of this ferment due to phosphorus poisoning. In this respect the behavior of ereptase differs from that of esterase. For, as above noted, it was found that the feeding of sugar increased the esterolytic power of both normal and phosphorus-poisoned dogs.

FUNGI.

Mushrooms and Toadstools. Howard A. Kelly[2] in opening up this old yet new subject to the profession, dedicates his essay to Sir William Osler, on the occasion of his seventieth birthday in July, 1919, when he is proving himself the best refutation of his jesting computation of the years of a man's usefulness. Because of its practical importance this article is abstracted here rather extensively.

Kelly believes that in every large community there should be enough men interested in mushrooms and toadstools, to form a little club for their study and for the promotion of useful knowledge about them. The author's reasons for urging the entrance upon this new field are:

1. At least one or two hundred deaths occur annually in the country at large from mistakes in identity and from eating poisonous species.

2. The fact that we actually import about forty million pounds of mushrooms every year, while vastly

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(2) Therapeutic Gaz., June, 1919.

greater quantities of excellent esculent fungi decay in our own fields and forests, because we are too ignorant to discriminate between the very few poisonous kinds and the many good ones.

3. Because anything, that will take the doctor out into the fields, is a good cause worthy of zealous promotion.

The chief of all rules for the mycophagist (fungus eater) is *"Never eat any species you do not know well."* The next rule, a corollary from this one is: *"Go slow in adding to your list of edibles."* To this the author adds for safety's sake, don't rely on the judgment of another amateur like yourself.

Avoid all that are no longer fresh and firm, or which have small burrows due to grubs. Avoid the large colored forms until you are well advanced in the subject. All except the *Amanitas* may be tasted without swallowing with entire safety; avoid all that have a powerful peppery or nauseous taste. Avoid those with a milky juice until you know a great deal about them. Try the large white forms which grow on tree trunks. Try meadow, field and street mushrooms.

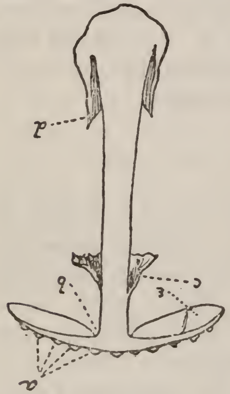

Fig. 21. *Composite picture* of an *Amanita.* (*a*) Warts on cap, (*b*) free gills, (*c*) ring, (*d*) volva or "death-cup," (*e*) short or dimidiate gill.

Poisonous Fungi: Avoid the genus Amanita. They are the worst poisonous species (See Fig. 21), recognizable by more or less of a boot, or ragged remains of one, at the bottom of the stem, and ring well above on the stem. They are among our most attractive and beautiful species, the very aristocrats of all the fungi.

Collect and study the deadly Amanitas first. If you don't know the *Amanita* group so as to avoid it, and yet venture to collect and eat mushrooms, you are liable to fatal poisoning. On the other hand, to know the easily recognized *Amanita* group settles the question of any great danger to life in eating fungi.

When young, "in the button," they are egg-shaped and completely enclosed in a veil, or sac, which ruptures, as the cap pushes upwards, and remains attached at or near the bulbous base as a cup (appropriately known as the "death cup"), fragments or warts, or simply as ragged remnants (Fig. 22). In order to recognize this most important marking it may be necessary to dig up the *Amanita* with care as the cup may be concealed below the ground, when if you cut the fungus off above the cup you might easily be led to exclaim: "No cup, therefore safe to eat!" Also the *Amanitas* have a ring on the stem above the cup, just below the cap or pileus. No *Amanitas* grow on trees, but all on

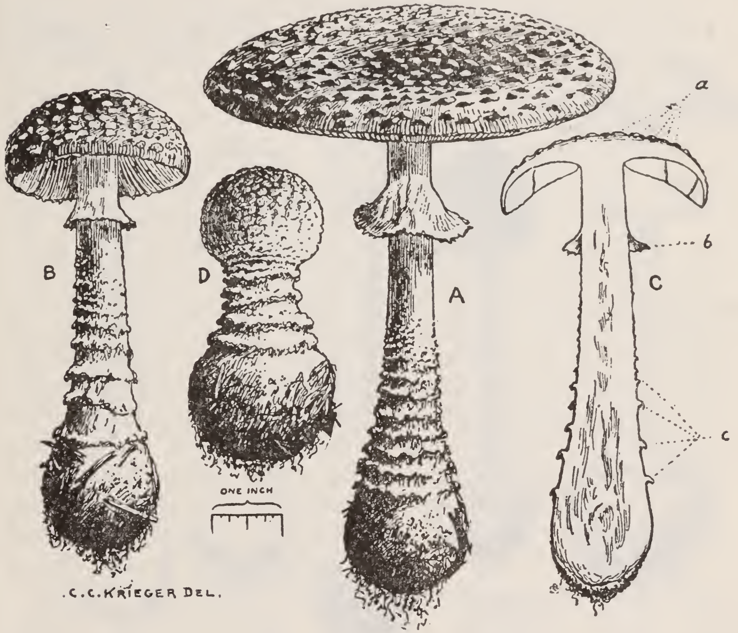

Fig. 22. *Amanita muscaria,* common American form; whole series. Note the concentric scaly rings of the volva, as they are being formed by the growing plant, D and B.

the ground. The genus *Amanita* is a large one. The author figures only two forms of the commonest dangerous species, *Amanita muscaria* and *Amanita phalloides,* and some of its varieties. *Amanita muscaria* (Fig. 22), much used as a fly poison, whence its name, is one of the most beautiful objects in the vegetable kingdom, tall, graceful, often four to six inches across the top, and colored blood-red, orange-yellow, or pale and the top is characteristically sprinkled with clinging shreds (warts) of the cup or volva. Below the cap there is a soft, fluffy ring, (annulus) on the stem, and attached

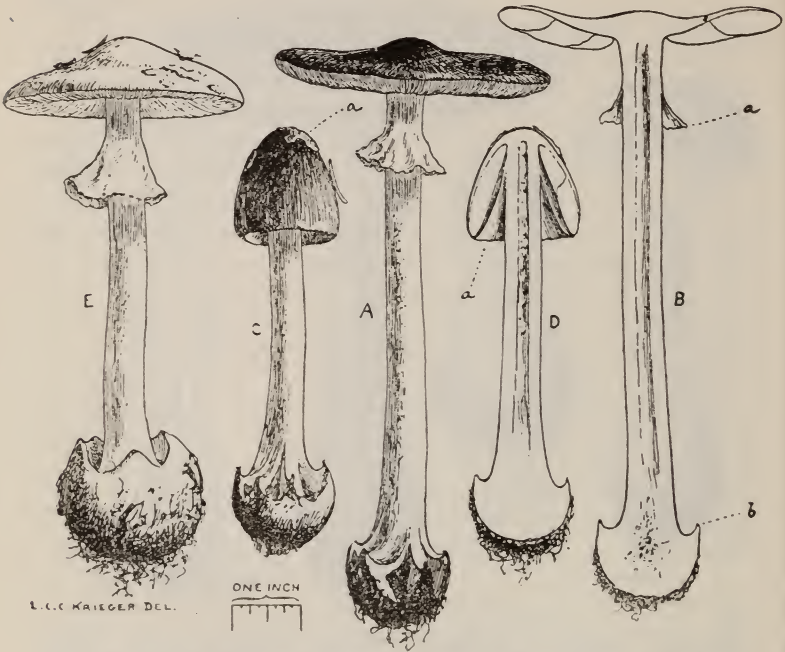

Fig. 23. *A, B, C, D, Amanita phalloides,* the common dark-gray-brown form. Note the longitudinally split bulb, and the absence of the "free limb" of the volva. Patches of the volva are shown adhering to the cap at *C* (*a*).

E, The citrine variety of *A. phalloides* (or *Amanita citrina,* of some authors). Note the huge base with the thick segments of the "free limb" of the volva.

to the usually bulbous bottom of the stout stem is the cup or its remnants.

Amanita phalloides (Fig. 23), the most deadly of all known mushrooms, is as large as muscaria, but is smooth, shining white, dusky or lemon yellow, and not commonly carries the marked remnants of the volva, or death-cup, sticking onto the top of the cap or pileus.

Many of the poisonous *Amanitas* are further distinguished from our edible mushrooms by having white gills, and if the caps be laid on a piece of paper when mature they all shed white spores; and they have the distinguishing cup or volva, or its fragments, at or near the base. Our common edible mushroom has at first pink and then dark chocolate-brown gills, sheds dark purplish spores, and has a ring, but no cup.

Poisoning does not frequently occur from *Amanita muscaria* as it has a bitter taste, and usually is not eaten in sufficient quantity to do serious harm. The symptoms produced by it are due to the action of the alkaloid muscarin, which causes dizziness and nausea, pallor, with oppression of breathing, restlessness, spasms of the jaw, and coma. The treatment is first of all to administer atropine in large doses, as it is a perfect antidote for the muscarin. If the patient has not vomited freely, the stomach should be emptied, and the bowels moved freely as soon as possible.

Almost all deaths come from eating *Amanita phalloides,* or its spring congener *Amanita verna.* In poisoning of this type, there is a stage of from six to fifteen hours during which no symptoms are felt; then there is severe abdominal pain, vomiting and diarrhea with blood and mucus. The loss of strength is rapid, and jaundice, cyanosis and coma follow in a few days. Convulsions may terminate the scene. While the patient may die within two days, the disease usually runs about a week. There is no known remedy. Death follows if much has been eaten. One or two specimens may kill; even one-third of a cap has proved deadly. The treatment is to wash the body out at both ends and to wash through, to use stimulants freely for extreme weakness and a narcotic when necessary to relieve the severe pains.

Another poisonous species is known as *Clitocybe illudens* (Fig. 24). This beautiful fungus is remarkable in that it is highly phosphorescent. Hence it is dubbed Jack-o'-lantern. It gives enough light at night to enable one to distinguish print. It is a bright deep yellow or saffron or orange color, and grows in large clusters at the base of tree trunks, has a depressed center and thinner wavy margin, and gills which run down the solid stem. The center is depressed from overexpansion of pileus; before this happens it is quite even, with a slight umbo or boss in the center. Don't mistake this for the excellent esculent *Chantrelle.* Its poison, not so virulent as that of the *Amanitas,* produces more or less violent gastro-intestinal disturbances with vomiting and diarrhea; some persons do not seem to be affected by it.

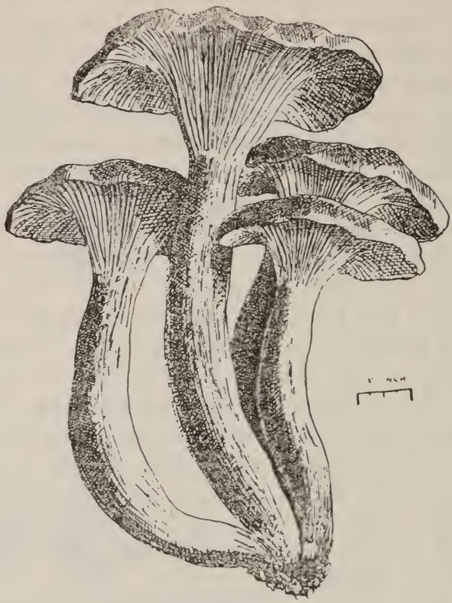

Fig. 24. *Clitocybe illudens,* Jack-o'-lantern; poisonous.

Finally, mention is made of several kindred smaller mushrooms which deposit black spores if laid for a time on white paper. They are more or less conical or bell-shaped, called *Panaeolus papilionaceus, P. campanulatus* and *P. venenosus.* Attention is called to the danger of confounding these with the ink-caps or Coprini. Panaeoli are black-spored, but non-deliquescent. Their effects are variable: in some people hilarity, vision of non-existent colors, giddiness, and sometimes temporary paralysis of a limb.

Avoid also the green-gilled *Lepiota* (to be spoken of below).

Edible Fungi.

Agaricus campestris (Fig. 25), the common mushroom of the fields, has pink gills when it is young, turning dark purplish-brown as it matures, owing to the color of the spores. The pileus or cap is fleshy and the stem is short and has a ring, which protects the gills while they are young. *Agaricus arvensis,* the horse-mushroom, is a coarser, larger plant with a strong amygdaline odor and a double ring on the bulbous stem. The lower ring is stellately split.

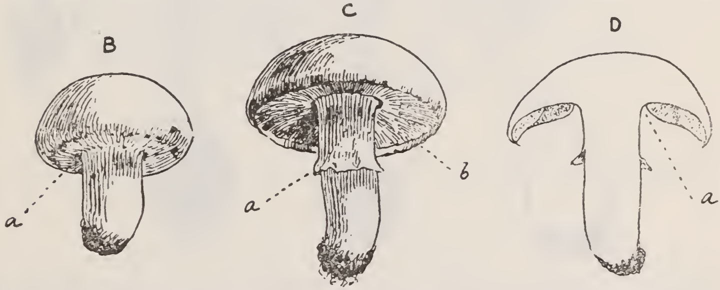

Fig. 25. Our common field mushroom, *Agaricus campestris. B,* shows "button" bursting its veil.

The parasol mushroom, *Lepiota procera* (Fig. 26), is one of the most beautiful of all our forms, with its graceful stem with a ring, *but without any cup below,* with a light-brownish, scaly top and with white gills not at-

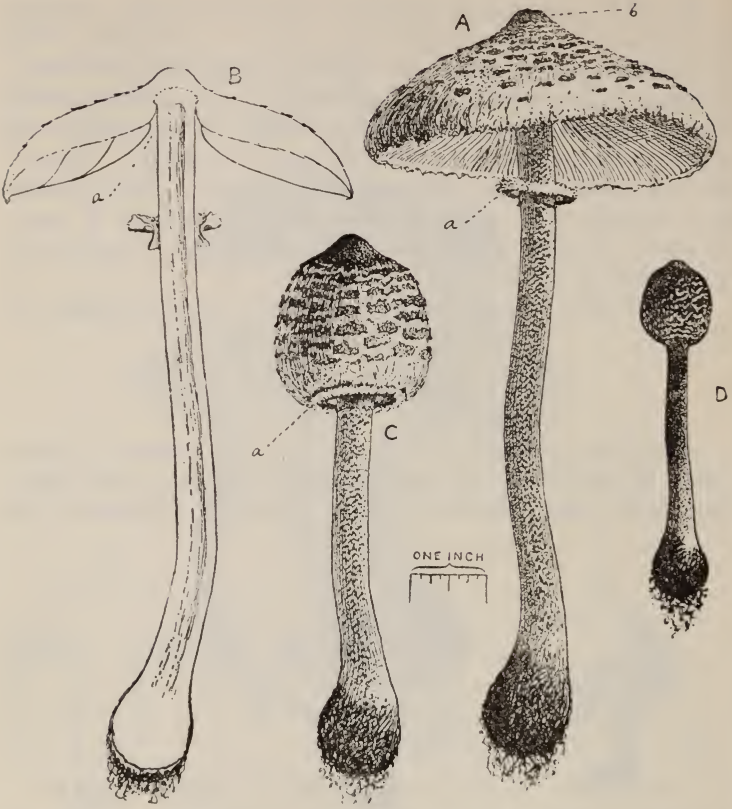

Fig. 26. *Lepiota procera.* From extreme youth to full maturity. One of the best of all our mushrooms.

tached to but remote from the stem; if the cap rests for a few hours on paper it sheds abundant white spores. There is a poisonous species in this genus of *Lepiotas,* called *morgani,* which has green spores and gills which become green. The stems of these two *Lepiotas* are inserted in a deep socket in the cap. The ring eventually becomes movable, like a bracelet.

The oyster mushroom, *Pleurotus ostreatus* (Fig. 27), is a most interesting and remarkable form, growing on trees, with its stem attached to one side and grouped in large number in an imbricated fashion in the form of shells one over the other. The stem is short, or almost none, and the gills are decurrent, running down the stem. The spore-deposit is white, or faintly grayish lavender in a variety. The fleshy part, which corresponds to the pileus or cap of an ordinary mushroom, is soft and rather shell-shaped, bearing on the under surface the somewhat distant gills, delicate, soft, and white, carrying the spores. The upper surface of the cap varies in color, but is usually some shade of grayish or violaceous brown. In other pleuroti the gills are not decurrent.

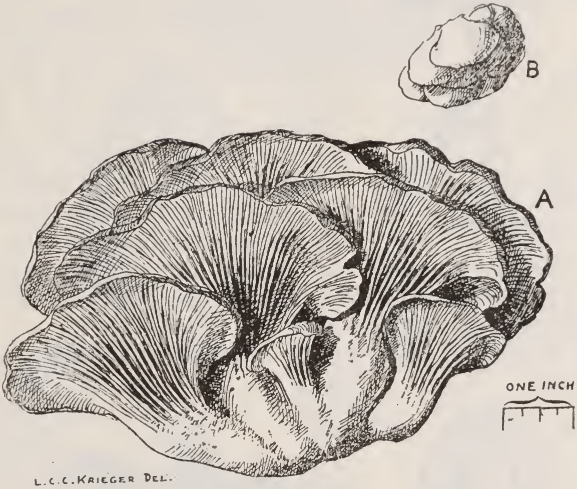

Fig. 27. Oyster mushroom, *Pleurotus ostreatus*. *A*, a cluster viewed from below. *B*, diagram of top-view showing imbricated mode of growth.

A Chantrelle, or *Cantharellus cibarius,* is one of the white-spored species, but is distinguished by the fact that its gills are much interconnected, with an obtuse edge, thick and fleshy, and run down the stem. In our species the stem is central, the pileus or cap is in the form of an inverted cone; its color, which is its most striking characteristic, is an unforgetable egg-yellow; it is also slightly depressed in the center. The stem is firm and solid and the flesh white. It is from two to three inches high and a couple of inches broad. Some smell like apricots, fresh and appetizing (Fig. 28).

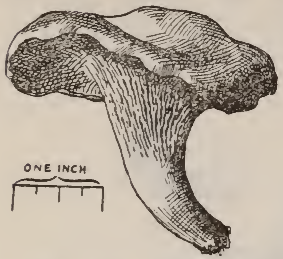

Fig. 28. Chantrelle, *Cantharellus cibarius.* This is somewhat less than natural size.

The *Coprini* or ink mushrooms are among the best of our edible species. They take their name "ink mushrooms" from the extraordinary highly specialized property they have of self-digestion so as to liberate the spores as they ripen. These belong to the black-spored group, and so are at the opposite end of the scale from the white-spored *Amanitas* and *Lepiotas* and *Cantharelli.* The inky deliquescence is not decay but perfect ripeness. These species can be eaten up to the point of the deliquescence (Figs. 29 and 30).

The beef-steak mushroom, *Fistulina hepatica,* called

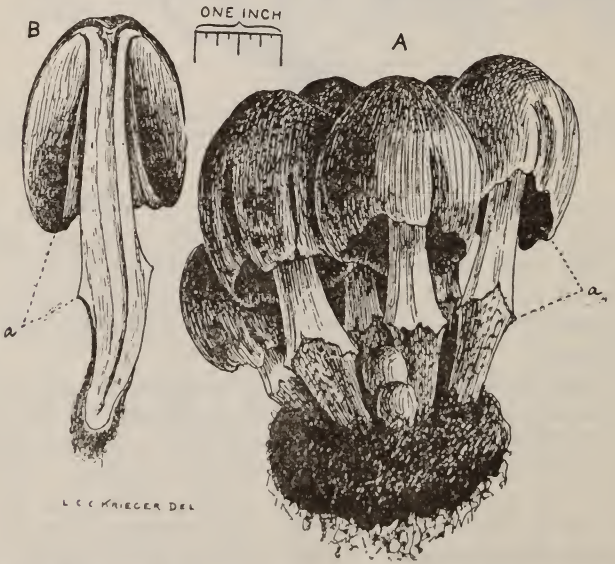
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Fig. 29. *Coprinus atramentarius* (one of the numerous varieties). At (*a*) in both figures is shown the characteristic "veil" (it is really the edge of the volva).

also Beef's Tongue (Fig. 31), is a striking and easily recognizable form of an esculent fungus. It belongs to the group with pores (polyporei), instead of gills, and is a bracket fungus growing from a tree, but unlike its congeners, the familiar hard forms, is soft and succulent. It is called hepatica from its liver color.

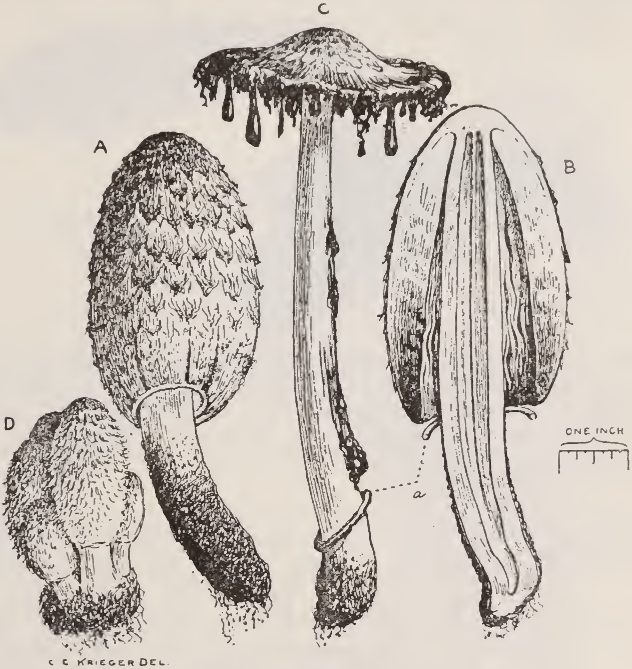

Fig. 30. *Coprinus comatus.* Whole series, from extreme youth to the last stage of deliquescence. At (*a*) the volva, or so-called "ring." Note the "cord" suspended in the hollow of the stem in *B.*

Among the most interesting of all the mushrooms are the puffballs, or devil's snuff-boxes, some of which open by an apical mouth (*Lycoperdon* among others) and discharge their spores in little puffing clouds, while others (*Calvatias*) break open on top in irregular fragments and so let their spores out into the air for distribution (Fig. 32). The big white ones are all good to eat when firm and white inside and are easily recognizable from the simple illustration (Fig. 33, *Calvatia gigantea*).

The author wishes here emphatically to call attention to a danger of mistaking *Amanitas* in the button stage for young puffballs.

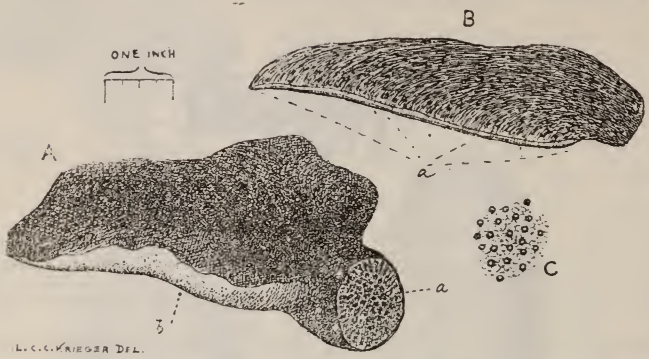

Fig. 31. Beef-steak mushroom, ***Fistulina hepatica***, about half natural size. *A*, mature plant, showing the "marbled" appearance at (*a*) due to the dark and light fibers which have been severed transversely. (*b*) Hymenium. *B*, section of a plant showing the fibrous structure within. (*a*) Hymenium. *C*, view of the hymenium under a hand-lens, showing the "papillæ."

Last of all in this short list, he speaks of a Morel (*Morchella esculenta*). This is one of the very best of all the edible species. The accompanying illustration (Fig. 34) shows so well the striking characters of a morel that it needs no further description. The cap or pileus is globose or ovate, ribbed and deeply pitted; the surface is made up of anastomosing ribs, or plates. It is borne on a stem, grows on the ground, and is one of the most striking forms we have. The interior of the stem and the cap are hollow, which permits the stuffing with meats, etc.

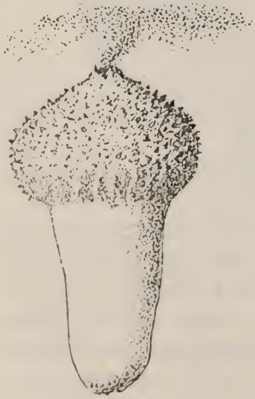

Fig. 32. Puffball, *Lycoperdon gemmatum*, natural size.

Preparing Mushrooms for the Table: Having gathered the mushrooms and carefully kept out of the basket any *Amanitas*, saffron-colored bunches of *Clitocybe illudens* and green-gilled *Lepiota*, we are ready to visit the kitchen and instruct the cook how to prepare them for the table. The sooner they are eaten after picking the better. Keep the mushrooms clean as they are collected.

L·C·C·KRIEGER DEL.

Fig. 33. Giant puffball, *Calvatia gigantea.*

Until used keep them in a cool place and throw away any withered or yellow ones if they have been kept long. When ready to cook, wash (but don't soak) them in a deep pan, rubbing gently, using a cloth if needed to wipe off soil or grit. Then drain them. Do not remove a clean skin, it adds to the tastiness. Thin, juicy specimens can be cooked in a little butter in about ten minutes; thicker, tougher specimens may require a half-hour or more with a little water added. The simplest methods of cooking are the best, as they preserve flavor; it is of no use to have a dish of mushrooms and then disguise the taste by smothering them in other ingredients, but it is always well to thicken the gravy with a little flour paste. Fairly large, well-opened caps can be broiled or baked; *Lepiotas* should always be treated in this way. In broiling, place them in a double broiler gills down and broil a couple of minutes, then turn and broil a couple of minutes more and remove, and while hot season, butter well, and serve hot on toast. They are best baked in a heated, covered glass for about fifteen minutes along with toast and a little cream and butter and seasoning. They make a pretty dish served individually steaming hot, covered with a clear glass top.

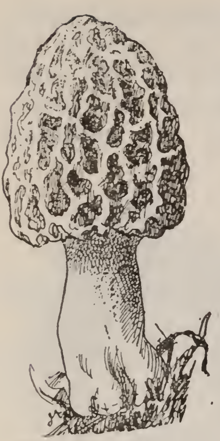

Fig. 34. Morel, *Morchella esculenta*, one-half natural size.

The pretty *Cantharellus,* egg-yolk in color, is prepared by cutting off the stems, cutting the caps into fairly large pieces, and simmering slowly over a low fire; they lose in flavor if subjected to a high temperature. Cook with a little fresh butter and olive oil, pepper and salt, and a little lemon-peel. After simmering for some twenty minutes a little beef gravy may be added, or cream, and finally the whole may be thickened with the yolk of an egg.

To cook Coprini, they are best put into a slow oven and covered to keep in the flavor. Trim the stems, wash them carefully and drain through a colander; spread in a long baking pan, pepper and salt lightly, put in some pieces of butter, cover with another pan, and bake in a moderate oven for 25 minutes. Then add several tablespoonfuls of cream, bring to a boil, dish on toast and serve.

Fistulina hepatica are best prepared by cutting into slices and frying slowly in butter, well seasoned. As it is sometimes acid, it may be immersed for about fifteen minutes in a solution of baking soda in water, the water poured off, washed again, and then cooked.

Pleurotus ostreatus or *ulmarius* ought not to be soaked in water, nor yet allowed to dry out before cooking. Cut off the stems, and cut into smaller pieces and stew over a slow fire in a little water, adding cream or milk, with butter and seasoning. To cook puffballs, slice them in pieces about a third of an inch thick, using only clean, white-looking specimens. Stew twenty minutes over a slow fire, adding cream or milk, with thickening, and butter and salt and pepper; they can also be fried like oysters.

HEROINE.

Heroine Hydrochloride Poisoning. W. R. Boyd[3] reports the case of a man who at 1:30 p. m. took a cachet supposed to contain barbital, 0.48 gm., and acetylsalicylic acid, 0.3 gm., but which contained 0.418 gm. of heroine hydrochloride, instead of barbital.

In less than one hour the patient was sleeping, and it was noted by the nurse an hour later that he was very tremulous and that his face was twitching and the skin acting freely.

At 5 p. m. he was sleeping soundly, but both arms and legs were frequently jerked, with strong, clonic, muscular spasms.

By 9:30 p. m. the condition was markedly changed. The respiration became labored, stertorous and very slow (seven a minute), the face was pallid, dusky, and the spasms of the limbs persisted. The pupils were contracted to pin points, and the patient could not be roused, though the corneal reflex persisted.

The muscles of the back of the neck were rigid; and, on lumar puncture, clear fluid not under increased pressure escaped.

The comatose condition persisted, but was peculiar in that an apparent awakening could always be produced by attempting to flex the head on the chest. This would

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(3) Med. Jour. Australia, Feb. 1, 1919.

give rise to an opening of the eyelids, an expression of "looking" and sometimes an attempt to raise the body into a sitting posture.

The temperature gradually rose and the pulse and respiration increased as a patchy bronchopneumonia developed at both bases.

Shortly before death the temperature was 40° C. (104° F.) and the pulse-rate 140, and the respiration 40.

This case, the author states, illustrates two points:

1. A large dose of heroine (probably 0.48 gm. or 8 grains) did not cause death until seventy hours after ingestion. [The death, it seems, ought to be ascribed to bronchopneumonia rather than to the heroine.—Ed.]

2. Heroine is more tetanizing and less narcotic than morphine.

MORPHINISM.

Etiology of Fifty Cases of Drug Addictions. A study of fifty patients voluntarily presenting themselves for the purpose of being freed from the clutches of the drug to which they had become addicted is reported by Carl Scheffel.[4] The offending drugs include bromides, chloral, cocaine, heroine, opium, and morphine; the last-named being the habit-forming drug in forty-one of the fifty addictions.

Insomnia and various types of recurrent headache rank foremost in the list of etiologic factors. Next to insomnia as a cause for which morphine is administered, is the treatment of alcoholism. Creating a morphinist out of an alcoholic is simply pulling him out of the frying-pan and throwing him into the fire.

Scheffel found that 92 per cent. of all addiction was caused either through the inability of the profession to relieve or cure difficult chronic conditions, or by the careless and promiscuous administration by physicians of dangerous habit-forming drugs over long periods of time, and many times in conditions where habit-forming drugs were absolutely not indicated. Most hypnotics

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(4) Med. Record, Nov. 16, 1918.

and practically all analgesics that are given internally may be habit-forming under certain conditions.

In the chronic conditions associated with more or less continuous or recurrent pain, extreme caution is called for in the administration of habit-forming drugs. Various forms of colic and dysmenorrhea are often the cause of drug addiction, only to be cured after the removal of renal or biliary calculi or proper gyneologic treatment. Why not remove the cause first instead of making the sufferers slaves to drugs only to require surgical interference eventually?

In view of the fact that the investigation shows 22 per cent. of physicians to be victims, it is evident that such drugs are not safe for self-administration by patients of any class.

Before resorting to repeated doses of habit-forming drugs in any given condition, physicians should make doubly certain that nothing else will be effective—and these drugs should always be a last resort.

The Cause of Increased Tolerance and Withdrawal Phenomena in Chronic Morphinism. A. G. Du Mez[5] in a review of the literature arrives at the conclusion that we are as yet unable to explain the mechanism of the increased tolerance of the system for morphine, codeine and heroin. No theory can be satisfactory that does not also explain the withdrawal phenomena on the discontinuance of the use of these drugs.

In 1883, Marme concluded that morphine was converted in the body into oxydimorphine, a substance having a diametrically opposite physiologic action to that of morphine, and contended that this substance produced the abstinence symptoms, and also the cause of the increasing amounts of morphine required to neutralize its effects; thus accounting for the increase in tolerance. Unfortunately, subsequent investigations could not identify oxydimorphine in either the blood or urine of dogs in which tolerance to morphine had been established. Furthermore, it has been shown that oxydimorphine does not possess the properties assigned to it

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(5) Jour. Amer. Med. Ass'n., April 12, 1919.

by Marme. Hence, Marme's conclusions relative to oxydimorphine are erroneous.

Pettey (1913) as a result of clinical studies, believes that the repeated use of opium or its alkaloids gives rise to the formation of toxins (of autogenous and intestinal origin) which act as irritants to the nerve tissues, and that increasingly large amounts of morphine are necessary to counteract the effect produced. That the withdrawal symptoms are due to the formation of some unidentified toxic substance in the body appears to be highly probable in the light of the comparatively recent discoveries of Valenti (1914). When the administration of morphine was stopped in the case of dogs after a period of developing immunity, marked circulatory disturbances made their appearance. These consisted of increased frequency of the pulse, severe arrhythmias, and arterial hypotension. These promptly disappeared if morphine was again administered in quantities sufficient to produce the so-called morphine pulse. When the serum of these dogs, taken during the abstinence period, was injected into normal animals of the same species, the foregoing syndrome was promptly produced.

Faust (1900) from his investigations was led to the conclusion that the system in the case of dogs acquires the power to destroy increasingly large amounts of morphine. In view of the confirmation of his results by other observers, there is no reason for doubting that morphine is destroyed to some extent in the living organism. That, however, destruction of morphine is not the sole cause for establishment of tolerance was shown by Rübsamen in 1908. In experimenting with rats, he observed that animals immunized to large quantities of the drug, showed at a given moment the presence in their bodies of sufficient morphine to produce toxic effects in animals that had not previously received the drug. Therefore, in addition to the increased power of the organism to destroy morphine, the cells of the tissues must have become less sensitive to the action of the drug.

That the tolerance was due to an antitoxin has been claimed by a number of experimenters. However, contradictory results obtained by other investigators place a negative value on any theory in which it is necessary to assume the direct action of an antibody. Furthermore, it is not in keeping with our present theories of immunity to pronounce the immune body an antitoxin, for we are not aware of an antibody which also possesses toxic properties [nor of an antigen of alkaloidal nature. —Ed.].

[We must therefore assume that the phenomena are due to a combination of increased tolerance and increased destruction with the action of an unknown poison of antagonistic action that is also responsible for the withdrawal symptoms.—Ed.]

NON-PHARMACAL THERAPEUTICS.

DIET.

The Significance of Fats in the Diet. This subject is discussed by Ernest H. Starling,[6] who says that it has been established that a certain quantity of carbohydrates is essential, as a diet in which fat takes the whole place of carbohydrates produces acidosis, the oxidation of the fats being defective in the absence of carbohydrates. Hence, some carbohydrate is necessary for the health of man unless he is to be reduced to partake of an abnormally large diet of protein for the sake of obtaining the necessary carbohydrate (as, for example, among the Esquimaux).

Is there any evidence of a similar limit in the case of fat? In Germany owing to a marked shortage of fat, this has been reduced in the towns to about 20 grams a head a day. In this case, certain diseases have occurred which have been ascribed to the deficiency in fat and have been cured by increasing the fat in the diet. These morbid conditions are marked by a generalized dropsy. But a deficiency of fat in the diet is almost always associated with and due to a shortage of food supplies generally. Just as an extensive diet of

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(6) Brit. Med. Jour., Aug. 3, 1918.

salt may produce dropsy, so a diet excessive in carbohydrate increases, in the first place, the water content of the body and this factor, when associated with inanition and fat shortage, may itself produce actual dropsy.

In babies, rickets is associated by some with deficiency of fat in the diet. In this case a more important factor seems, however, to be an absence of some food hormone or vitamine associated with butter, cod-liver oil, and many other kinds of fat, and, according to Mellanby, it can not be cured except by giving a fat containing the substances in question.

The absolute physiologic need of the cells of the body for fat supplied as such seems, therefore, to be unproven in view of the capacity of the body for manufacturing fat out of carbohydrates given in excess of the physiologic requirements for energy. This conclusion, however, does not mean that fat is unnecessary in a normal diet. Several other points have to be taken into consideration.

Fat-poor diet leads to premature hunger, for, whereas the greater part of carbohydrate is absorbed three hours after food has been taken, the most intense absorption of fat occurs between five and six hours after a meal. On this account, a meal lacking in fat is deficient in staying power.

In the second place, the bulk of food must be of considerable importance. Weight for weight, fat has more than double the caloric value of starch and sugar. But the difference in bulk is still greater, since fat is taken without admixture in a pure form, whereas the other foods are all mixed with a considerable proportion of water.

The human alimentary canal has been developed so as to cope with a diet in which from 20 to 25 per cent. of the energy is presented in the form of fat. In order to get the same energy from carbohydrates, the alimentary canal would have to be much larger.

In the third place, carbohydrates are more subject to fermentative changes in the intestines than fats. Overloading the intestines with carbohydrates leads in many individuals to abnormal fermentation, the production of gases, and general discomfort. We may conclude, then, that there must be some relation between the quantity of fat necessary and the total energy requirements of the individual.

As to the minimum desirable ration of fat, Starling finds that the suckling takes 50 per cent. of its nourishment in the form of fat. After weaning, the proportion of energy yielded by fat drops to about 35 per cent. during the first five years of life, and then drops further to about 25 per cent. during the rest of childhood. In a normal diet of the adult, the fat should account for from 20 per cent. to 25 per cent. of the energy of the whole diet.

When, however, the energy requirements of the individual become excessive—for example, 4,000 calories and more daily—we find that in almost all cases the proportion borne by the fat energy to the total energy is considerably larger than 25 per cent.

If a man is called upon for an extreme expenditure of energy, either in performance of work or in order to maintain his body temperature in excessive cold, he must take more food; and since his alimentary tract does not constantly increase in extent in proportion to the augmented demand upon it, it is necessary that the large increase in the food be taken in the most concentrated form: namely, as fat. The preponderatingly fat diet of the arctic and antarctic regions is therefore dictated not only by the nature of the food available in these regions, but also by the size of the human alimentary canal in relation to the energy demands of the body as a whole.

The Comparative Food Value of Protein, Fat and Alcohol in Diabetes Mellitus. H. O. Mosenthal and G. A. Harrop, jr.,[6] gave patients, during control periods of six days, diets of a constant protein, fat and starch content, and of such caloric value there was a negative nitrogen balance. The fats and proteins were approximately equal to each other, gram for gram; the carbohydrates

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(6) Archiv. Int. Med., December, 1918.

were those unavoidably present in the green vegetables. Subsequently definite amounts of protein, fat and alcohol were added to the dietary, and the effect on the nitrogen balance noted. The results have been so consistent that the conclusion seems justified that fat is of no great value from the point of view of addition of nitrogen to the body in a protein-fat diet.

Alcohol, even more constantly than fat, fails to bring about an assimilation of nitrogen, and is not to be recommended for the dietary of the diabetic if it is desired to spare protein. A positive nitrogen balance is readily achieved in diabetes on protein-fat diets with a high protein content, and such an assimilation of nitrogen may persist for a considerable period before nitrogen equilibrium is reached. This would point to a high protein diet as the most advisable low-calory, carbohydrate-free diet by which to conserve the body tissues and furnish a maintenance ration for the diabetic.

The Effect of Diet on the Healing of Wounds. Admont H. Clark[7] studied the effect of diet on wound healing in dogs. He found that the diet seems to affect the length of the quiescent period. The protein-fed dogs have no quiescent period, the contraction beginning at once. The carbohydrate dogs have a quiescent period of three days, those on the mixed diet, of four days, and the fat-fed dogs, of six days. After the sixth day the curves run parallel and the dates of final healing differ by the same amount as the lengths of the respective quiescent periods.

The reason for this difference is probably to be found in the fact that the ingestion of proteins produces a much greater increase in body metabolism than that of any other foodstuffs. This increase in metabolism, or excess energy, given off by the body as a result of the ingestion of food, may be regarded as waste energy, but we may consider the extra heat developed under these conditions as a normal physiologic stimulus to cellular activity. The results reported by Clark certainly support the idea that proteins have a specific influence in stimulating the cellular system to greater activity.

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(7) Bull. Johns Hopkins Hosp., May, 1919.

SUGAR.

Nutrient Enema of Sugar Solution. G. W. Greene[8] suggests the following technique for rectal feeding, which he employs successfully in the treatment of ulcer of the stomach. He gives no food by stomach for two weeks; and feeds the patient by giving rectal injections of sugar as follows: Three teaspoonfuls of sugar are dissolved in one glass of water; of this solution he gives a syringeful which holds 30 ml., every 10 or 15 minutes.

Intravenous Use of Dextrose. A case of obstipation with extreme dehydration from continued vomiting is reported by A. J. Caffrey.[9] He gave 500 ml. of heat-sterilized dextrose solution, 25 per cent. strength intravenously, by means of the ordinary arsphenamin outfit, repeated the dose the next day and followed by the glucose solution given by the Murphy drop method for twelve to fourteen hours. This treatment was followed by recovery to which Caffrey believes these dextrose injections and hypodermic injections of 0.0012 gm. of atropine sulphate twice daily materially contributed.

VITAMINES.

As W. D. Halliburton[1] says, "the conception underlying the word *vitamine* bids fair to have as far-reaching results as those which have followed a study of the internal secretions and the introduction of that other modern word *'hormone.'* "

To label a disease by a specific name, beriberi, rickets, etc., to fathom its cause, and to lead us to a rational and successful treatment of the same, is no mean accomplishment; but what about those more numerous ailments to which it is impossible to give a name, so vague and puzzling are the symptoms they exhibit. May it not be that many so-called minor conditions of malnutrition may be due to lack of vitamines, or to a deficiency in their supply?

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(8) Med. Record, April 12, 1919.
(9) Wisconsin Med. Jour., April, 1919.
(1) Brit. Med. Jour., May 10, 1919.

Although at present three vitamines have been brought into the light of investigation, who can say that the list is complete? It is more than probable that obscure and apparently trivial complaints may in the future also be found to be deficiency diseases. An obvious state of malnutrition in the infant may pass away, and yet may leave its mark behind it and cause far-reaching results later in life. Take, for example, that curse of modern days—dental caries. Mrs. Mellanby[2] has shown by experiments on puppies, that this is a condition of diet deficiency—probably a deficiency (earlier in life) of a vitamine not very different from fat-soluble A.

Halliburton reviews the elementary principles of our knowledge of the vitamines as follows: "When these bodies are withheld from the food, as when chemically pure proteins, fats, carbohydrates, salts and water are administered, health deteriorates, in young animals growth ceases, and, if the treatment is continued, death is the inevitable result. Health can be at once re-established if the diet is amplified by adding to it a natural food, such as a small amount of milk, for foods as they occur in nature contain the accessory factors necessary for growth and maintenance. So many are the treated, purified, and sophisticated foods at present on the market, that it is most important to remember that these are but poor substitutes for the foods which are made in Nature's laboratory."

Research has progressed far enough to make it certain that there are numerous vitamines. It is around three of them that research has mainly centered. They are products of the plant-world. Animals have greater synthetic powers than was formerly believed to be the case, but, so far as is at present known, they are not able to synthesize or manufacture vitamines. The vitamines can be separated by their varying solubilities in water and other agents. They can be distinguished by their varying powers of resistance to heat and other drastic agencies, and, further, they are differently distributed in various foods. The diseases due to their

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(2) Lancet, Dec. 7, 1918; abstracted in Practical Medicine Series, Vol. IV, 1919, p. 11.

absence are very conveniently grouped together as "deficiency diseases" [avitaminoses—Ed.]. Among such diseases are beriberi, pellagra, and, coming nearer home, scurvy and rickets.

The first of these vitamines is contained in the embryo or "germ" of cereal seeds. When milling is carried to a high degree, this portion of the grain is removed, hence polished rice and superfine wheat flour are of inferior value as foods. It is now firmly established that beriberi, the disease of the rice-eating nations, is due to the use of polished rice, and can be prevented or cured by adding the polishings to the diet. Using the noncommittal nomenclature introduced by American physiologists, it is now usual to speak of this vitamine on account of its solubility in water, as "water-soluble B."

"The second is contained in the majority of animal fats (lard is an exception), and is particularly abundant in milk fat, and in certain fish oils such as cod-liver oil. It is specially important as a growth factor and therefore indispensable in early life. It is absent in vegetable fats. Here we have one more indication of the value of milk for the young, an explanation of the potency of cod-liver oil in curing malnutrition, and a warning of the danger of vegetable margarines if employed as the only source of fat in the food of the growing section of the population, or of expectant mothers. It is usual to dub this vitamine 'fat-soluble A.' There is accumulating evidence to show that its absence or deficiency is an etiologic factor in rickets. Like its water-soluble companion, it is ultimately a vegetable product, and is contained in high concentration in the green portions of plants.

"The third vitamine is also soluble in water, and, as Dr. Drummond suggests, it may be called 'water-soluble C.' This is the antiscorbutic principle, and is found in the juices of fruits (the orange and lemon are here preeminent) and in most edible vegetables. It is characterized by its extreme lability, being destroyed by moderately high temperatures, treatment with alkali, by desiccation, canning processes, and the like. Hence arises the value of fresh fruit and vegetables in the prevention of scurvy."

Changes in the Teeth Produced by Scorbutic Diet. An editorial in the *Journal of the American Medical Association*[3] calls attention to the research work of Zilva and Wells upon changes in the teeth of guinea-pigs produced by scorbutic diet. Even the mildest degree of scurvy produced, without exception, well-defined changes in the structure of the teeth. In advanced cases, the teeth were apparently sound, but really useless, having become loosened by absorption of the alveolar sockets; the teeth presented all the appearances of the changes of senility.

The teeth are among the organs first affected by scurvy; and it is not at all unlikely that tooth defects arise from dietetic faults that have not been clearly recognized in the past. The frequency of "latent scurvy" in New York was pointed out by A. F. Hess;[4] and this might help to elucidate the reason for the widespread prevalence of tooth defects in civilized man.

The reason why the alveolar process, and with it the teeth, are so easily affected by malnutrition is given by E. S. Talbot[5] to be the fact that it is a transitory structure as well as an end-organ. When the child is first born there are no teeth, hence there is no alveolar process. This builds itself about the teeth while they are developing. When the first set of teeth, developed for the purpose of masticating soft substances, is shed, their alveolar process is absorbed. When the second set of teeth appears to take care of the harder and more varied food required, an alveolar process builds itself about these teeth, giving them greater strength than the first set. When the second teeth are extracted or lost, the alveolar process again absorbs away. That the teeth, on the other hand, are dependent upon the alveolar process is well shown by its normal senile absorption, which in some may begin as early as 30 years, and in every mouth after the age of 50, leading to loosening of the teeth and their final loss. In metal poisoning, the first symptoms are developed in the alveolar process. Malnutrition,

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(3) Aug. 9, 1919.
(4) Jour. Amer. Med. Ass'n., Jan. 27, 1917.
(5) Ibid., Sept. 13, 1919.

anemia, even some heart lesions produce alveolar bone absorption. It is therefore easy to understand that improper diet may affect this sensitive structure.

Talbot believes that the dental profession has gone "daft" on the subject of bacteria as a cause of disease in the mouth, and that the powers of resistance have as much to do with diseases in the mouth as in other parts of the body.

The Influence of Vitamine Deficiency on the Intestine. By feeding pigeons to, or almost to, the point of death with autoclaved milled rice—a food almost lacking entirely all classes of vitamines—R. McCarrison[6] showed that not only is neuritis produced by absence of the so-called antineuritic vitamine (water-soluble B), but that there are also marked changes produced in the intestine, such as congestion and hemorrhage, atrophy of the muscular layer, degenerative changes in the myenteric plexus of Auerbach, atrophic and inflammatory changes in the mucous membrane, atrophy of the lymphoid structures, and fibrosis. These changes favor infection, as is shown by the fact that infection of the blood from the bowel is no uncommon consequence of vitamine deficiency.

The author ventures to suggest that certain gastro-intestinal disorders in the human subject might owe their origin to subminimal supply of vitamines protracted over long periods of time. Thus, just as he found diarrhea a common symptom of vitamine deficiency in pigeons fed exclusively on autoclaved rice, he believes "mucous disease," so common among European children in India—who are fed largely on sterilized milk, artificial foods, over-cooked vegetables, white bread, polished rice, poor butter, and excessive quantities of sugar—might owe its origin to deficiency in accessory food factors. In evidence of the correctness of this theory may be cited the readiness with which the disease yields to limitation of carbohydrates and to a rationally balanced dietary of good "vitaminic" quality.

Another disease that bears a striking resemblance to the pathology McCarrison has observed in his pigeons

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(6) Brit. Med. Jour., July 12, 1919.

is "celiac disease"; and its absence in breast-fed children, as well as its onset between the age of nine months and two years, all point to a food deficiency as its causation.

The author even goes so far as to suggest that chronic intestinal stasis might possibly have its genesis in imperfect vitaminic balance. "There can be no doubt," he says, "that the dietaries of the children among the poorer, and often among the richer, classes are frequently deficient in these important ingredients. Subsistence upon such ill-balanced dietaries from childhood onward may be regarded as calculated to lead to defect of the abdominal musculature, to neuromuscular lesions of the intestines, and to changes in the glandular elements of its mucous membrane." Indeed, the pathologic changes in the large bowel in stasis, as described by Professor Keith, are strikingly similar to those occurring in pigeons fed on a vitamine-free food.

The Distribution of the Known Vitamines. An editorial in the *British Medical Journal*[7] contains an excellent summary—therefore given here practically in full—of a memorandum issued by the Committee on Accessory Food Factors, appointed jointly by the Medical Research Committee and the Lister Institute.

The memorandum, which is signed by the chairman, Prof. F. G. Hopkins, and the secretary, Dr. Harriette Chick, has been compiled in order to afford practical help to those occupied in the administration of food relief in the famine stricken districts of Eastern Europe. It discusses the distribution and properties of the accessory factors, the antineuritic or anti-beriberi factor (water-soluble B); the antirachitic or growth factor (fat-soluble A), and the antiscorbutic factor (water-soluble C).

Passing lightly over the antineuritic factor, the memorandum states that evidence is accumulating that rickets is caused by a shortage not of fat as such, but of the fat-soluble growth factor, which is contained in certain fats only. It is absent from vegetable oils or present only in negligible amount, and is absent also from lard.

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(7) July 19, 1919.

It is present in notable quantities in cream, butter, beef fats, fish oils, such as cod-liver oil, and egg yolk. To prevent rickets in infants and young children, should full cream milk be unavailable, or its use thought inadvisable owing to risk of infection, the best sources of this factor are full-cream dried milk or full-cream unsweetened condensed milk. The dried milk is preferable to the condensed milk, but if either is used an extra antiscorbutic should be given.

Green leaves are a cheap source of the fat-soluble vitamine. The loss in ordinary cooking is not serious, and adults can probably maintain good health when animal fats are replaced by vegetable fats, provided green-leaf vegetables are consumed in fair quantity. To infants or very young children the juices expressed from cabbages and other green-leaf vegetables—raw or after steaming, but not boiling, for a few minutes—may be given, as also a teaspoonful a day of purées prepared from cooked spinach or lettuce. Pregnant and nursing mothers should have as liberal supply of the fat-soluble factor as possible. It is thought that xerophthalmia may be due to want of it, and it is advised that, should this condition, or rickets or growth failure exist, a daily dose of cod-liver oil ought to be regarded as essential, in addition to all procedures.

For the prevention of scurvy the use of germinated seeds[8] is advised. The seeds should be soaked in water for a day and kept moist with access of air for one to three days more, by which time they will have sprouted. It is the sprouted material which possesses antiscorbutic value. It should be cooked in the ordinary way, but for as short a time as possible. The richest sources of the antiscorbutic factor are cabbages, swedes, turnips, lettuce, watercress, lemons, oranges, raspberries and tomatoes. Potatoes, carrots, French beans, beetroot, mangolds and lime juice are inferior. The antiscorbutic factor is destroyed by heat, drying, or other methods of preservation, and all tinned vegetables and tinned meat are deficient in the antiscorbutic principle. The acidity of fruit increases the stability of the accessory factor,

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(8) Practical Medicine Series, 1919, Vol. I, p. 429.

and to some extent prevents its destruction during the sterilization by heat and subsequent storage of tinned fruits. Artificially nourished infants should receive an extra antiscorbutic. Cow's milk, even when raw, is not rich in the antiscorbutic factor, and this is still further reduced by heating, drying and preservation. The most suitable antiscorbutic material is fresh orange juice, from 1 to 3 or 4 teaspoonfuls daily, according to age. Raw swede juice is said to be a potent antiscorbutic and an excellent substitute for orange juice. The clean cut surface of the swede, or if that is not obtainable, of the turnip, is grated and the pulp squeezed in muslin.

Antiscorbutic Property of Dried Orange Juice. M. H. Givens and H. B. McClugage[9] found that orange juice, dried at a low temperature, was active after three months' storage. They suggest that dried orange juice might serve as a convenient antiscorbutic for use in infant feeding, on polar expeditions, in the navy, and for soldiers during war.

ELECTROTHERAPY.

Urinary Incontinuence in Children and Adults, Cured by Electric Methods. Francis Hernaman-Johnson[1] writes: "For the child who 'wets the bed' the present time treatment may be summed up as follows: (1) Removal of irritation, *e. g.,* phimosis, worms; (2) limitation of fluid in the latter portion of the day; (3) drugs, *e. g.,* strychnine as a tonic; belladonna as a so-called specific, and medicines to alter the composition of the urine, such as citrate of potash; thyroid; (4) education; (5) suggestion. These measures, either singly or in combination, often succeed; as often, they fail."

The authors personal experience of the treatment of enuresis was, until the beginning of the war, almost entirely confined to children. The little patients who were sent to him had all been dealt with for prolonged periods on classical lines without success. He found these cases almost all amenable to very simple electric

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(9) Amer. Jour. Dis. of Child., July, 1919.
(1) Practitioner, May, 1919.

measures, *viz.,* the application of the rhythmically interrupted sinusoidal or faradic current through the region of the bladder for fifteen minutes daily for a period of from two to four weeks.

In the latter part of the year 1914, as a result of the recruitment of large numbers of men, a new type of case was brought prominently before his notice, *viz.,* the young adult afflicted with enuresis. Treating these on the lines which had been found successful in children, not more than 25 per cent. were successes.

An interesting fact discovered in these cases was that in almost all the sexual feelings were quite undeveloped, even in youths of 21 to 22 years, in spite of a normal appearance of the external genitals. As in children enuresis often ceases spontaneously about puberty—*i. e.,* among other things coincidentally in the development of the prostate—the author determined to try to stimulate this organ electrically in these incontinent cases and chose a high-frequency condenser electrode for the purpose. It consisted of a small test tube, filled with water, and corked. Through the cork was thrust a stiff wire, having a loop on the outside for attachment to the lead from the solenoid. The test tube was vaselined and introduced about two to three inches into the rectum. It was then connected with the generator, and the high-frequency current turned on for fifteen minutes. The treatment was given daily.

An improvement in results was very soon evident. Cures rose from 25 to 60 per cent. On the psychic side, not all cases—or indeed many—could be investigated, but such as were gone into showed that, *pari passu* with the disappearance of the incontinence, there was a development of normal sexual feeling; in more than one case the result was an early marriage. The time taken to effect a cure was about three weeks. As a rule, if there was no improvement in the first ten days, the case did not do well. A few patients, however, ultimately recovered after from two to three months, when hard *x*-rays to the lumbar region were combined with the high-frequency current. It is difficult to say what part, if any, was played by the *x*-rays.

MECHANOTHERAPY.

Compression of Diaphragm Relieves Rebellious Hiccup. D. F. Venegas[2] has relieved patients by having them lie supine and flexing the legs and then flexing the thighs to the extreme on the abdomen. This pushes up the contents of the abdomen and the spasm of the diaphragm relaxes usually within ten minutes. The same measure can be applied anew if the hiccup returns. Distending the stomach with carbon dioxide, by having the patient swallow 5 gm. each of citric acid and sodium bicarbonate accomplishes the same result.

Friction Massage to Stimulate Growth of Hair in Postfebrile Alopecia. R. Sabauraud[3] advises friction massage (administered preferably with a tooth brush), and tonic lotions for ten minutes daily for a woman, four minutes for a man. The idea that cutting the hair aids in its regeneration is erroneous, for, if frequent cutting made hair grow better, men would have better hair than women.

Effects of Moderate Exercise on the Blood-Pressure. This subject has been studied by Gerald Smythe[4] after one hour's "moderate muscular exercise" practiced as a routine in the army. A summary of his figures shows that, after muscular exertion, the pulse-rate tends to be only slightly altered; the systolic B. P. is lowered by 5 mm.; while the diastolic B. P. remains the same.

The lowering of the mean arterial B. P. in healthy subjects is due to vaso-dilatation in the skin and muscles. Such exercises do not incite the ventricle to increased or more frequent action, nor do they diminish the force of the ventricular beat.

These observations are in agreement with those of all other observers that during the actual performance of an exercise involving physical strain the systolic blood-pressure rises. When the effort is over, there is a fall in the pressure.

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(2) Rev. de med. y cirug. pract., July, 1919.
(3) Paris méd., June 7, 1919.
(4) Practitioner, April, 1919.

Rest in Treatment of Pulmonary Tuberculosis. Rest is considered by H. M. Kinghorn[5] of greater importance than any other single factor in the modern treatment of pulmonary tuberculosis. There are still too many physicians who advise exercise at the beginning of treatment, when active pulmonary tuberculosis is present. At this time the patient should have no exercise, but should have either the reclining rest treatment, or absolute rest in bed.

When there is fever there must be rest. That is the great medical principle which applies to the patient with pulmonary tuberculosis as well as in cases of all other fevers.

PSYCHOTHERAPY.

Relief of Insomnia by Reduction of Sleep Threshold. G. J. Mautz[6] started about ten years ago, along the popular line of mental gymnastics, in an attempt to control the mental states. Since the dreaming state lies between consciousness and sound sleep, just at the threshold of sleep the idea was to make patients dream themselves to sleep. Directions were to avoid reasoning and analysis, to direct any train of thoughts into the absurd and grotesque.

About 20 per cent. of patients will admit benefit from this alone. Others need the following method in addition: Natural sleep is ushered in by shallow, slow respirations. It is through this natural physiologic pathway that we should attempt to lead our subjects, thus imitating Nature's process.

"The subject should be placed in the best possible environment, with good ventilation. He should be quiet and warm, and should be directed to find a comfortable position and stay in it. He should breathe slowly and shallowly, not too slowly at first until the body becomes accustomed or adjusted to being quiet and in the recumbent position. After allowing about ten minutes for this, he should breathe less and less. Different subjects

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(5) Amer. Rev. Tuberculosis, June, 1919.
(6) Jour. Amer. Med. Ass'n., Dec. 14, 1918.

apply the same principle differently; they learn little tricks that suit their own case. Probably the best method is for him to take a fair respiration and hold after exhalation as long as he can with comfort, then slowly take another, exhale and hold again. He should be directed to continue in this manner. The subject may at first feel that he can not control or diminish his respirations, but a little patience and effort will in a short time (within two weeks) prove that he can."

Psychotherapy Assisted by Electrotherapy in Treatment of Hysteria. J. M. Wolfsohn[7] agrees with Babinski that for "hysteria," which is a misnomer, we should substitute "pithiatism," which means the possibility of being cured by the influence of persuasion.

On an experience with 573 cases of hysteria treated in British and American Army hospitals, Wolfsohn claims that in more than 90 per cent. of the cases the cure was accomplished within the first twenty-four hours. The extremes varied from five seconds in some of the aphonics to more than seventy-hours in some of the dysbasias of long standing.

The most important part of the treatment is the confidence of the physician in the correctness of his diagnosis and in his ability to produce a cure. This air of assurance spells immediate success. No one can convince others who himself is unconvinced.

Wolfsohn is not in favor of slow methods, such as the purely reëducative methods nor of psychanalysis.

Hypnotism has been discontinued by most physicians on account of the frequent relapses and otherwise indefinite results, except in treating insomnia and in combating terrifying dreams and hysterical convulsions.

General anesthesia with ether, combined with strong suggestion in the excitement stage, finds its most successful use in the intractable cases of hysterical deafness.

The best of all treatments in the author's hands has been strong suggestion, reinforced by some mechanical agents which will assist in relieving at least some of the disturbed functions. This is easily administered with the aid of faradism or galvanism, and the results are

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(7) Jour. Amer. Med. Ass'n., Dec. 21, 1918.

quick and complete. Thus in uncomplicated cases of mutism, strong suggestion combined with faradic stimulation of the sides of the neck in increasing strength, the patient at the same time being shown how to produce the vocal sounds "e," "ah," "a," etc., usually suffices to produce articulation quickly. The patient then learns how to adjust his tongue to utter a squeak, which, as a rule, is rapidly followed by letters, especially the labials and dentals, then numbers, the months of the year, and finally sentences. If a hypesthesia or anesthesia over the trachea is found before treatment, it is used as a lever for further suggestions because the disturbed sensation can be easily removed by the faradic brush.

Hysterical Deafness: After inserting a stethoscope into the ears of the patient, different tuning forks of various vibration lengths are quickly and successively held at the bell of the stethoscope and the patient is told to nod when he hears something and to reproduce the sound heard. When he can finally do this for low notes, the voice of the operator is then substituted for the tuning forks, and beginning with a loud voice the distance between the patient and operator is gradually increased. Then the loudness and pitch of the voices are diminished. Finally the stethoscope is removed and one ear is blocked. The patient is told to repeat quickly the things he hears while the operator rapidly changes his voice from loud to soft and then to a whisper, while he gradually increases the distance from the patient until the latter can hear the whispered voice from 10 to 20 feet away. If one tests the bone conduction by applying a tuning fork over the mastoid region, the patient receives some intimation that he is not completely deaf. This is used as an auxiliary suggestion and is followed by the treatment outlined above.

In hysterical aphonia the vocal cords should always be carefully examined prior to treatment. If these look normal other than failing to approximate equally on attempted phonation, it is well to tell the patient that he is about to get his voice back immediately. Then, very often, simply gargling with a 10 per cent., salt solution is sufficient for the patient to be able to make an articulate "ah." He is then quickly re-educated. Sometimes tickling the soft palate with the tongue held protruded will produce the same result; but, these failing, faradic stimulation of the sides of the neck, as in mutism, practically always cures in a few minutes. By similar means Wolfsohn has cured hysterical stammering, blepharospasm and blindness, disturbances of gait, and hysterical tics, tremors and convulsions.

Wolfsohn gives the following rules of treatment:

Study each case fully. Take a complete family and personal history, especially for previous nervousness or similar attacks, even though the character of the affection seems evident.

Study each case psychologically, before instituting treatment. This can take the form of a psychanalysis in the cases in which emotivity plays a prominent part. Encourage the patient to talk of himself and thus gauge his mental conditions.

Produce an atmosphere of cure in the wards or office. This is best accomplished by contact with cured patients. A confident, optimistic atmosphere has helped to cure more hysterical symptoms than all the mechanical appliances.

The patient must seek the cure.

When the patient resists the cure, this must be broken down by strong persuasion, long continued, or by faradism.

The physician must, at all times, be master of the situation. He must have a ready response to all questions put to him by the patient.

Do not discontinue the treatment until the cure is accomplished.

Let the patient into your confidence, and explain to him in simple terms how his symptom is caused and how you propose to cure it immediately.

Be absolutely sure of your diagnosis before beginning treatment.

A quiet, firm sympathy, together with an air of supreme confidence, is essential for the "air of recovery" in the treatment room.

Hysteria is often promoted in the ward by mental contagion. If a severely affected patient is admitted it is best to isolate him for a short while and thus prevent this contagion.

The earlier the treatment is instituted after the occurrence of the symptom, the easier and more complete the cure. The fixation of the idea is thus prevented.

During the treatment of a paralyzed member, watch for the slightest voluntary movement of the limb on the part of the patient and use that for the point for further suggestion.

The method of treatment varies with the mentality of the patient, the desire of recovery, the degree of education and his social level. To the cultivated and intelligent, frankness should be the keynote. Suggestion often suffices for the cure. To the uneducated, simple suggestion plus a material method is usually necessary.

To avoid the distraction of the patient during treatment, all extraneous noises and movement should be eliminated.

The physician must possess a strong will power. He can not convince unless he himself is convinced. He must display kindness, but his commands must be full of authority.

Results of treatment depend on the physician who plays the leading part. The patients are cured when they find their master.

Do not lose your temper. Have patience.

Select the best time for treatment; and, if not successful after a time, cease and recommence under a more favorable opportunity, explaining to the patient that rest is the cause for stopping. Meanwhile he should be completely isolated.

Do not give fresh suggestion to the patient or threaten him unless he is known to be a malingerer.

The ease of curability is largely dependent on the duration of the symptoms and the nature and number of previous treatments.

Contractures are more persistent than paralyses.

Strict military discipline and regular outdoor work are the necessary after-cure of these patients.

Make the disease an unprofitable one for the patient.

The cure of a hysterical symptom is a mental combat between the physician and the patient, in which the victory is on the side of the physician. This is the secret of psychotherapy.

The patient should be observed for a few weeks after the cure.

The most potent causes of failure to cure are ill will of the patient, unfavorable surroundings, and mistakes in diagnosis.

RADIUM.

Internal Use of Radium. D. C. Moriarta commenced with 15 milligrams of the element in the form of soluble chloride; 10 milligrams for an emanatorium, and 5 milligrams with which to activate water. He continued its use regularly in his practice since that time, as opportunity presented, with many successes and few disappointments. Each patient was treated in the emanatorium for two hours daily for a period of six weeks. There were 270 Maché units of radium emanation to a liter of air. Varying quantities of activated water were given internally, usually a half liter which contained 113,000 Maché units to the liter, and some of the patients had also intravenous injections of radium salts. Three developed a marked reaction from the treatment (without intravenous injections) which was manifested by increased pulse rate, temperature, nausea and vomiting, and great prostration, lasting in each case about 48 hours. Moriarta finally succeeded in establishing a tolerance in these cases by commencing with a very small dose and gradually increasing it.

Two cases of arthritis deformans were decidedly improved. In three cases of diabetes results were negative. Two cases of intermittent claudication were relieved, that is, the attacks of pain subsided and remained quiescent for about eight weeks. In eleven cases of cardiovascular-renal degeneration, the following results were obtained constantly: (1) general feeling of well-being and betterment, (2) diminished blood-pressure, (3) increased kidney efficiency, (4) decided increase in number of red blood cells, in amounts varying from 150,000 to 1,500,000.

Duration of treatment must be prolonged, as radium is largely indicated in chronic morbid conditions. Radium *per se* is not a specific in any disease. Its chief action is to increase promptly and efficiently the number of red blood cells.

Radium Treatment. It is reported by Dawson Turner[9] that he has found radium consistently useful in exophthalmic goiter. He has now treated over fifty cases with radium; and, with one exception, all of these patients derived more or less benefit. The exception was a woman, 22 years of age, who suffered from extreme nervousness, and who died, within a fortnight of the treatment, of hyperthyroidism and toxic phenomena. The benefit that patients with exophthalmic goiter derive from the expert application of radium is in their general condition and in their special symptoms; but, while the thyroid gland becomes harder and denser, it usually does not diminish in size, and the exophthalmos is but little affected. It is well to warn patients of this, lest they suffer disappointment at the neck swelling remaining the same. Operative measures to reduce the size of the gland might now be considered, both because the vascularity is diminished, and because the patient is better able to stand an operation. The writer is in the habit of treating each lobe, and the isthmus of the thyroid, and the thymus. A dose of from 200 to 400 milligram hours, properly screened so as to avoid injury to the skin, may be given over each of these areas; and the patient may then be sent home for some three months, when more treatment may, if necessary, be given.

As compared with Roentgen-rays in the treatment of this condition, radium has the following advantages: (1) Absolutely constant emission of rays and therefore exact dosage possible; (2) far greater penetration of its rays, so that the deeper parts of the gland are

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(9) Edinburgh Med. Jour., February, 1919.

reached; (3) no noisy, exciting apparatus, so that the treatment can be applied at the bedside without, in any way, disturbing the patient. The words *cito, tuto, et jucunde* can fairly be applied to the radium treatment of exophthalmic goiter.

Radium is of benefit in malignant disease. In suitable cases it is of great benefit, even at times bringing about an apparent cure. Sarcomas are more easily dispersed than carcinomas, and of sarcomas, lymphosarcomas, in the writer's experience, are the most amenable. Those on the surface of the body, and those affecting the cervix are the most favorably situated. The buccal cavity, respiratory and digestive passages and internal organs are unfavorable positions. An exception may perhaps be made in the case of accessible sarcomas of the nasal region.

In order that a malignant growth may be successfully treated by radium, the growth must be localized and accessible; further, the whole of the growth must be given a sufficient dose—the periphery as well as the center. The dose must be accurately estimated, and the maximum dose given at the first treatment. The majority of more or less suitable cases of malignant disease treated by a radium expert get well (are temporarily cured), but in the course of time recurrences and metastases carry the patient off; these can be again subjected to treatment but, as a rule, less successfully than the primary growth.

Dawson Turner reports a number of cases in which patients have remained well for more than three years after primary treatment, but, he says, they are relatively rare.

The Value and Limitations of Radium in Treatment of Cancer. That the value of radium therapy in malignant growths has been established and is incontestible, is the opinion of R. H. Boggs.[1] Treatment of hopeless carcinoma in the past has been with morphine; today it should be radiotherapy. One of the most striking results of radium therapy is that the secretions, which are often offensive, disappear almost in every case. In

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(1) New York Med. Jour., March 22, 1919.

recurrent and inoperable carcinoma of the uterus, radium might be considered the specific treatment. Its advocates, however, do not claim that it supercedes surgery; but that it is a valuable adjunct to surgery in helping to prevent recurrences after operation and in rendering inoperable cases operable, and that it has proved itself one of the best palliatives we have in cases in which operation is impracticable and in many of such cases has brought about an apparent cure. Radium should always be considered first in the treatment of epithelioma, because, when properly applied, practically all epitheliomatous tissue can be made to disappear and there are fewer recurrences than by any other method. Radium in tubes, at a certain distance apart and at a certain distance from the skin, placed over the submental and submaxillary areas (which are junctions of the lymphatics), so that they are bombed with intensive radiation, and the adjacent lymphatics treated by deep Roentgenotherapy, is more effective in destroying the malignant cells in the lymphatics of the neck than the most careful dissection of the neck. Since much has been accomplished in the inoperable cases of carcinoma, in every primary case, no matter how early the operation has been performed, there should be either ante-operative or post-operative radium treatment or both.

Radium Treatment of Cancer of the Prostate. Encouraging results have been obtained with radium by R. H. Herbst,[2] in prostatic cancer, a condition in which radical excision can not be carried out with any reasonable degree of safety and success except in the very early cases, which unfortunately are hardly ever encountered clinically.

Through a suprapubic cystotomy wound, gold needles, 1 inch in length, each containing 12 mg. of radium, are inserted into the tumor mass, 1 cm. apart in different directions, converting the tumor virtually into a pin cushion. A silk guide, which is attached to each needle, is brought out of the suprapubic wound and by this means the needles are withdrawn after from twelve to fifteen hours. This treatment can be repeated after a

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(2) Jour. Amer. Med. Ass'n., May 31, 1919.

few weeks if necessary. As most of the tumors begin in the lower part of the gland, a second introduction of needles is made into this part of the tumor by making a dissection through the perineum and obtaining a complete exposure of the lower part of the prostatic mass. It is well to allow from four to six weeks to elapse between the two steps of the operation.

The Technique of Radium Applications. This is described by D. T. Quigley.[3] The specimen should be from 60 to 90 per cent. pure and at lest 50 mg. of radium element should be used. The author prefers the ''massive dose'' method, disregarding burns in every case—for burns from radium are benign—except where hollow organs, or blood-vessels, or special sense organs might be broken into.

He takes, as an arbitrary standard, the resistance of the average skin of the chest or abdomen. The dose required—length of time of application to produce a burn in these locations, by means of a certain specimen screened by silver, rubber and gauze—he would arbitrarily designate 100 units. Then the following schedule may be employed:

Skin of face	75	units
Skin of scalp	125	"
Skin of groin	65	"
Skin over buttocks	125	"
Skin over fascia lata	125	"
Skin over ears	60	"
Skin over eyelids	50	"
Edge of eyelids	80	"
Eyeball	80	"
Mucous membrane of lips and cheeks	50	"
Mucous membrane of tongue	70	"
Mucous membrane of rectum	20	"
Mucous membrane of urethra	10	"
Mucous membrane of larynx	70	"
Mucous membrane of bladder	25	"
Wall of uterus	300	"
Buried in tissues: bone	300	"
muscle	200	"

Carcinoma is the most resistant tumor to deal with. It requires 100 units. Sarcoma is probably twice as

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(3) Minnesota Med., March, 1919.

radiosensitive as carcinoma, and would require 50 units. Fibroma and myoma are perhaps the most radiosensitive, requiring only 10 units. Angioma responds very readily, especially in children.

Accurate approximation is essential. As light decreases in power as the square of the distance, a tube 1 mm. from the diseased spot will give 100 times the dose, as the same tube placed 10 mm. from the surface.

ROENTGEN RAYS.

Disturbances in Metabolism Produced by Deep Massive Doses of the Hard Roentgen Rays. C. C. Hall and G. H. Whipple[4] studied the metabolism of dogs subjected to a sufficient Roentgen-ray exposure to produce death. They found that dogs given a lethal dose of hard Roentgen rays from the Coolidge tube have a latent period of twenty-four hours or longer, during which the dog is normal except for an increase in urinary nitrogen. Vomiting and diarrhea then dominate the clinical picture until death, which as a rule follows on the fourth day.

The blood non-protein nitrogen commonly shows a marked increase (twice normal) on the day before death and often more than three times normal on the day of death.

The elimination of urinary nitrogen is increased on the day following the Roentgen-ray exposure and remains high until death, often an increase of 50 to 100 per cent. above the normal base line.

On autopsy, the spleen is found small and fibrous, there is a moderate grade of congestion and mottling of the intestinal mucous membrane, and strong evidence for epithelial injury in the intestinal mucosa. The epithelium lining the intestinal crypts may show actual necrosis and invasion of polymorphonuclear leukocytes.

The epithelium of the small intestine apparently is especially sensitive to large doses of the Roentgen-rays, and the injury of these important cells may furnish the

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(4) Amer. Jour. Med. Sci., April, 1919.

correct explanation of the general intoxication associated with the vomiting and diarrhea. Neither kidney nor liver epithelium is fundamentally involved in the fatal Roentgen-ray intoxication.

Effect of Roentgen Rays upon Immunity. The effects of small doses of x-rays upon the blood of rats and upon the susceptibility of these animals to tumor implantation were studied by S. Russ, H. Chambers, G. M. Scott and J. C. Mottram.[5]

They found that the natural immunity which animals usually have toward the inoculation of spontaneous tumors can be broken down by a Roentgen-ray exposure sufficient to cause the disappearance of the lymphocytes.

Acquired immunity can likewise be broken down, but only so long as lymphoid cells are reduced in number.

In contrast to these actions, an immune condition can be produced instead of destroyed by small doses of Roentgen-rays.

The authors conclude that Roentgen-rays when administered to an animal have two actions, quite apart from their direct effect upon a tumor: (*a*) A large dose of rays, destroying the immune condition, will favor the growth of a tumor; (*b*) a small dose by producing the immune condition will help to control and may overcome the growth of a tumor.

The bearing of these facts upon the radiologic treatment of malignant disease in man appears to be as follows: Whenever a tumor is exposed to Roentgen-rays the lymphocytes circulating in the blood-vessels of the growth and of the surrounding tissues will be irradiated; or, if the site of operation be treated, the lymphocytes in the normal vessels and tissues will be similarly exposed. It is clear, therefore, that though the radiologist may be giving the primary growth the dose of radiation required for its disappearance, he may at the same time be indirectly encouraging the development of secondary growths by lowering the natural powers of resistance of the patient, especially if this comparatively large dose is repeated at fortnightly intervals, as in post-operative treatment.

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(5) Lancet, April 26, 1919.

It would appear profitable, therefore, to take all possible precautions to prevent the destruction of such cells as the lymphocytes which, there is good reason to believe, play a defensive rôle in many varieties of malignant growth.

By the use of small doses of Roentgen-rays, repeated at intervals, it may be that the resistance against the development of secondary deposits can be increased in a similar way to that which occurs in the case of an experimental inoculation.

Roentgen-Ray Treatment of Dysmenorrhea. F. Hernaman-Johnson[6] reports that dysmenorrhea, especially of the hemorrhagic type, can be successfully dealt with in most cases by small doses of hard *x*-rays given two or three times a week in the menstrual intervals, for three to four months. A regulation of excessive ovarian activity is what is aimed at, there being no desire to abolish the periods.

Roentgen Treatment of Uterine Fibroma. E. A. Weil[7] claims that time has demonstrated the value of cross-fire exposures.

He exposes each field once or twice, going over them all successively on consecutive days. Then he recommences the exposures after an interval of at least a month. He usually gives four series of exposures, but after the first two he leaves an interval of at least five weeks. The course thus lasts six months, but the menopause sets in and the pains are much improved by the second month. As less than 2 per cent. of uterine fibromas display a tendency to malignancy, while the mortality from operative treatment of uterine fibromas is at least 5 per cent., Roentgen therapy should be the rule and operations the exception for all uterine fibromas, even the painful and the hemorrhagic ones, except in case of easily removable pedunculated myomas and those of exceptionally rapid growth, which should be removed without delay.

Cautery and Radiation in Treatment of Cancer of the Oral Cavity, Jaws and Throat. Electrothermic

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(6) Practitioner, May, 1919.
(7) Ann. de la facultad de med., January-February, 1919.

destruction followed by Roentgen rays is the procedure advised by William L. Clark.[8] The destructive methods to be considered are electrodesiccation and electrocoagulation. The desiccation method is one by means of which malignant growths of small or moderate size may be destroyed by the utilization of heat of just sufficient intensity to desiccate or dehydrate the tissues. The heat is produced by a monopolar high-frequency current of the Oudin type, which is applied to the lesion by means of a steel needle or other pointed metallic applicator (usually steel knitting needles) which may be cut and curved, if necessary, to suit the case under treatment. The desiccation method is of advantage when the lesion is localized and a good cosmetic result is desired. It is subject to such control as to area and depth that a very small growth even on the cornea may be successfully treated without injury to vision, as may a growth on the vocal cords be destroyed without impairing phonation. The very slight trauma and absence of secondary inflammation probably explains the absence of scarring and the success obtained in treating delicate structures.

Electrocoagulation, produced by a bipolar high-frequency current of the d'Arsonval type, is more penetrating and intense in action than the desiccation method, and is utilized to destroy large growths, including those that involve bone.

While the cautery is comparatively superficial in action, the high-frequency current, under proper conditions, will penetrate and destroy tissue to any depth.

Deep, cross-fire Roentgen therapy, according to standard technique, should be applied to the neck after dissection of the cervical glands, with the hope of preventing recurrence. When the glands are not involved, the Roentgen-ray should also be applied to them after electrothermic treatment of the primary lesion. The Roentgen-ray is of more value in the latter instance than in the former, as its use often prevents involvement of the glands, and, when they are involved, the Roentgen-ray will often retard the progress of the diseases. Deep, cross-fire Roentgen therapy may be used following elec-

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(8) Jour. Amer. Med. Ass'n., Oct. 26, 1918.

trothermic destruction at the site of the primary lesion to reach possible outlying cancer cells, as may radium, especially within the mouth; but the same area should never be treated by both the Roentgen-ray and radium. Either Roentgen-ray or radium alone is without value in the treatment of cancer within the oral cavity, but the Roentgen-ray is of undoubted value as an adjunct to electrothermic methods and surgery.

Preventive Medicine

EDITED BY

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PREVENTIVE MEDICINE.

MEDICAL SOCIOLOGY AND ECONOMICS.

Health Insurance. It is predicted by G. V. Sheridan[1] that the imminence of state health insurance will force the medical profession to organize actively in order to bargain collectively. Workmen's compensation proved that an unorganized profession will suffer great hardships under an accident insurance scheme when not adequately organized. It is reasonable for physicians to expect dire results if a state health insurance scheme finds them unprepared. If physicians refuse to recognize the fact that their sole strength lies in organization and attempt to meet this big new proposal on an individualistic and bull-headed basis most unpleasant consequences for them will follow.

The Ohio Health and Old Age Insurance Commission.[2] This report in favor of health insurance runs as follows:

1. The principle of health insurance is approved as a means of distributing the cost of sickness.

2. Health insurance should be required for all employees to be paid for by employers and employees in equal proportion. The state to pay all costs of state administration.

3. The benefits to workers should consist of: (*a*) Cash payment of a part of the wages of workers disabled by illness. (*b*) Complete medical care including hospital and home care and the cost of all surgical care, medicines and appliances. (*c*) Adequate provision for rehabilitation, both physical and vocational. (*d*) Dental care. (*e*) Medical care for the wives and dependents.

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(1) Ohio Med. Jour., July, 1919.
(2) Report, Columbus, Ohio, February, 1919.

4. (*a*) The exact form of organization of the medical, hospital and dental service should be left to the state health insurance commission. However, minimum standards should be established. (*b*) Medical, hospital and dental care should be adequately compensated.

5. The insurance should be carried in establishment funds mutually managed.

6. The system should be administered by a state health insurance commission of four members, one of whom shall be the state commissioner of health.

A second part of the report deals with old age pensions.

One member of the commission made a minority report as follows: He objected because the people had not asked for it; sufficient study had not been made as to the method of operation and the effect on American standards. He thought the compulsory feature wrong in principle. The distribution of cost equally between the employer and employee does not equitably place the burden upon society as a whole. Before adopting experiments all possible resources should be utilized to prevent sickness. To place upon society the responsibility of individual failure would bring us dangerously close to policies which are at present of the gravest concern the world over.

Two other members objected to the recommendation that health insurance should be required of all employees to be paid for by employers and employees in equal proportion.

The report contends that it is just as much the function of the state to look after health, and particularly child health, as it is to provide education. In 1915, there were 13,127 deaths of children under 5 years of age or 19.8 per cent. of the deaths for all ages, although such persons were only 10 per cent. of the population. The infant mortality rate of Ohio is 91 per 1,000 births. Of the deaths under 1 year of age 14.9 per cent. occur during the first day of life, 32.9 per cent. during the first week of life and 48.3 per cent. during the first month. From 50 to 70 per cent. of all children of school age are defective to some extent. The great majority of the defects are correctible.

The Ohio draft boards examined 167,828 men, and of these 43,771 were found physically unfit—26.08 per cent. To this should be added 8.33 per cent. rejected at re-examination. Of the defects noted in the draft examinations, 60 per cent. could have been prevented or corrected.

From 700 to 800 mothers lose their lives in childbirth in Ohio yearly.

The commission estimates that average loss from work in Ohio a year is 9 days *per capita.* Sickness is the leading cause of dependency. Great numbers of people live so close to the margin of income that unusual expenses force them to resort to charity or to borrowing. Sickness leads the causes of economic distress. Just as the burden of accident costs has been placed by workmen's compensation upon those responsible, so the burden of sickness should be placed upon those responsible —industry, the individual and the community. Of the sick, 20 per cent. are disabled for more than one week. Of those who are disabled for more than one week 19.8 per cent. are disabled for four weeks; less than eight, 6.4 per cent., for more than eight weeks; but less than twelve, 3 per cent., for more than six months; 1.2 per cent. are disabled for more than one year. Those who are disabled for more than thirty days generally require financial assistance.

Health Insurance in Various States. John R. Commons and A. J. Altmeyer contribute a study of the health insurance movement in the United States. Eight state commissions have reported on health insurance. The California report favored it as did the Massachusetts Commission. The New Jersey Commission did likewise. A second Massachusetts commission reported adversely. In January, 1919, six commissioners representing California, Connecticut, Illinois, Pennsylvania, Ohio and Wisconsin were still at work on their reports. The attitude of employers' associations is antagonistic to health insurance. A majority of the medical profession are likewise opposed to it, as are the druggists. A majority of labor organizations are against it if we can judge by those which have spoken. The insurance companies likewise oppose it. The Christian Scientists are against it. The social workers generally are for it.

Health of Miners. E. R. Hayhurst[3] found miners below the average in health. He advised as follows:

1. That the state department of health be made advisory to the department of mines in all matters pertaining to health.
2. That existing schemes of health insurance be standardized.
3. That all employers be required to carry health insurance providing both cash benefits and medical care.
4. That trained nursing services, physicians' services and various social services should be extended into the miners' territory.
5. That miners should have better hospital and dispensary service and improved diagnostic facilities.
6. That physical examination of prospective employees should be instituted; also upon the return of a miner to work after an absence. It is suggested that this be done in connection with state employment agencies.

[This report, as well as several of the other state commission reports, contains the results of investigations in medical economics and sociology not found elsewhere.—Ed.]

The Illinois Report. The Illinois Health Insurance Commission[4] has made the following recommendations:

1. That the authority and powers of the state department of health be enlarged.
2. That wage earners under treatment in county tuberculosis sanitoria be paid.
3. That the legislature make an appropriation for the control of venereal diseases.
4. That a commission be created to study the prob-

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(3) Report of Ohio Health and Old Age Insurance Com., February, 1919.

(4) Springfield, Ill., May 1, 1919.

lem of occupational diseases and methods of payment of compensation.

5. That a commission be appointed to study questions of maternity care.

6. That a county hospital with diagnostic facilities be provided in each county in the state.

7. That public health nursing be provided in each county in the state.

It will be noticed that no reference is made to health insurance in these recommendations. The committee purposely did not recommend it since elsewhere in the report they say: "It is the opinion of the commission that its findings do not justify it in recommending compulsory health insurance."

With this report, two members of the commission dissent. They concur in all of the recommendations of the commission, but they say:

"They fall far short of what is called for by the facts disclosed by the commission's investigations. Moreover we do not agree with the majority of the commission in their conclusions relative to compulsory health insurance. We believe that the results of the investigations made by the commission are conclusive evidence of the need for a system of compulsory health insurance which would be applicable to all members of the wage-earning group; would more equitably distribute the burden of the costs of illness and would make more adequate provision for the medical care of wage earners and their dependents who become sick. We believe that the conclusion of the majority of the commission is founded on an inadequate and somewhat misleading interpretation of the facts disclosed by the investigation of the commission."

The minority then sets forth a very logical, clear-cut, well systematized analysis of the evidence presented.

[Two groups of members of the commission reviewing the evidence presented arrive at what is essentially opposite conclusions so far as the main issue is concerned. The minority group alleges without equivocation that the majority have disregarded or misinterpreted the evidence.

The commission made a fair number of investigations and the report contains much not found elsewhere, as well as much of the standard evidence on the question. In such a dilemma, about the only way to decide which is right is to read all the evidence. The issue is so clear cut, the one side saying that the evidence printed in the report means one thing and the other side that it means another, that I presume before long reviewers will attempt to decide which party is right.—Ed.]

Opposition to Health Insurance.[5] Health insurance was opposed by C. J. Whalen before the Illinois State Health Insurance Commission on the ground that it would be too expensive and would increase poverty. He advocated better laws for the prevention of disease.

E. H. Ochsner arguing before the same commission opposed health insurance on the ground that it had harmed both the medical profession and the people in Germany and various other European countries. His remedy for existing conditions was better health laws.

J. R. Ballenger thought that there should be compulsory legal insurance if there is to be compulsory health insurance.

M. L. Harris demarcated the functions of the state as regards diseases as follows: "It is the duty of the state to provide the opportunity for the individual to care for himself." He thinks the state should do preventive work. Hospitals and dispensaries should not be run on a purely charitable basis. The medical profession in Germany and England, he said, is of low intelligence.

J. Fairhall opposed health insurance because it was based on the vassal system of Germany and the pauper system of England.

An editorial in the *Long Island Medical Journal*[1] says that the opposition to the proposed health insurance bill before the New York legislature came from the allied manufacturers, independent labor bodies, the Christian Science church and the medical profession. Four hundred physicians attended the hearing and all opposed

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(5) Illinois Med. Jour., January, 1919.
(1) May, 1919.

the bill. The editor thinks the profession as a whole made a poor showing and recommends that the profession form a guild independent of all medical societies, and that a paid lobby be kept at Albany during all legislative sessions to present effectively the point of view and the interests of the medical profession. The trouble, he says, with health insurance is that it takes the doctor for granted, instead of recognizing him as the foundation stone upon which the idea necessarily rests.

F. E. Rowe[2] is opposed to health insurance for Maine in great measure because the state is sparsely settled and there is no great industrial population.

Favoring Health Insurance. *American Labor Legislation Review*[3] prints the draft of the New York Health Insurance Bill drawn by the Health Committee of the New York Federation of Labor and the Association for Labor Legislation. This bill was advocated by the governor. It passed the senate but was strangled in the house committee being prevented from coming out of the committee or to a vote. The *Review* says that the bill will be introduced in 1920. The reasons for health insurance are given by the *Review* as follows:

Of the young men of the country examined in the draft, one-third were rejected on physical grounds.

Wage-earners of the country lose 250,000,000 working days a year because of sickness, making, at $2 a day, a wage loss of at least $500,000,000.

Degenerative diseases of adult life—the ''wear-and-tear'' diseases—have practically doubled in the last thirty years.

Sickness surveys in many cities show that about one-third of those too sick to work are without medical care.

More than 15,000 American women die every year from causes connected with childbirth, and 250,000 babies die in the first year of their lives.

Sickness is the largest single factor in dependency, causing seven times as many appeals to charity as do industrial accidents.

Trade union and fraternal sick benefit funds are able

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(2) Jour. Maine Med. Ass'n., September, 1918.
(3) June, 1919.

to reach only a small proportion of the people, and the health insurance of private commercial companies is poorly developed and excessively expensive.

Standards of Well-Being. F. S. Crum[4] approves of D. L. Hoffman's six groups of data by which we can judge a nation's health and well-being, to-wit:

1. The general urban death-rate.
2. The sickness rate in industry.
3. The accident rate in industry.
4. The number of arrests in large cities.
5. City expenditures for poor relief.
6. The ratio of unemployment.

Acting upon this suggestion the Division of Vital Statistics of the Bureau of the Census began a weekly report on deaths in forty-six cities representing about one-fourth the population of the entire country. Crum, investigating infant mortality rates in these large cities and applying the conclusions to the country, says that infant mortality is affected by season, place and location.

The rates are highest where the extremes of temperature are greatest. In studying the curve of any city the rate is always found to rise with extreme high and low temperature. He concludes that up to Sept. 28, 1918, the war had not served to increase the infant mortality rate. The same is true of New Zealand. The most immediately hopeful method of attack on high infant mortality rates is education.

High Cost of Living. Having before him the report of a survey of economic conditions in 2,084 families in New York City in the winter of 1917-18, made by nurses of the New York City Health Department, L. I. Harris[5] sees in it a justification of health insurance. He says, moreover, that the facts gleaned in this investigation can not help but give one whose point of view is at all altruistic a revelation of the need for health insurance because it shows how any illness may overthrow the economic balance which has been precariously maintained by a family; and, conversely, it shows how illness

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(4) Amer. Jour. Pub. Health, April, 1919.
(5) Ibid., July, 1919.

may be produced or aggravated or recovery retarded by general economic changes.

The survey also demonstrated the great advance in our conception of the possibilities of the health nurse and the need that the curriculum of the health nurses' education course contain lectures on household economics and especially the purchase and use of foods.

By early winter in 1917 it was apparent that the advance in the cost of living was profoundly affecting life in New York City. From the study, it was plain that the increase in wages was not keeping pace with the increase in the cost of living.

The survey showed that there was an increase of 9.1 per cent. in the persons availing themselves of charity. In 9.8 per cent. of the homes investigated the housewife had been compelled to enter industry in order to increase the family income; 26.5 per cent. of the children under 16 years of age were found to have stopped school and gone to work. The high cost of living had caused 17.8 per cent. of the families to go into debt; 5.7 per cent. of the families had taken boarders for the first time. There had been an increase in sickness; in 13 per cent. of the cases, recovery from illness had been retarded because of the high cost of living. Thirty-seven per cent. of the families had wholly eliminated meat from the dietary; in 17 per cent. the amount of meat used had been appreciably lessened; 828 families had eliminated eggs; 615 had eliminated butter; 143 had eliminated sugar.

The influence on the diet of children was as follows: In 293 families the use of bottle milk was given up, in all but eleven loose milk being substituted. In 296 families, milk was altogether eliminated from the children's diet. In seventy-one, the amount used was greatly reduced. Three hundred and seventy families eliminated butter and 191 greatly reduced the amount furnished the children; seventy-one eliminated sugar. Five hundred and forty-four families ceased giving the children meat, and 238 greatly reduced the amount supplied; 532 families eliminated eggs from the children's diet.

Sickness and Hospital Care. W. C. Meyer[6] has gathered together the results of many investigations of the sickness rates in American communities. This has been done in an argument for rural hospitals. There is greater need for hospitals in the rural districts than in the cities, and Meyer is engaged in propaganda work for hospital facilities in the country. He advocates such hospitals as community enterprises. He suggests, to begin with, that the physicians get acquainted with each other in diagnostic clinics and laboratories, failing, however, to mention the medical society as a point of contact where physicians come to bury the rather natural animosities of isolated medical practice. The visiting nurse is rather the natural forerunner of a community hospital. Statistics regarding the amount of uncared for sickness, its cost, and wastefulness, she can get together as she makes her rounds without the drawbacks of a survey made by outsiders. Such a gathering of local facts should always be done preliminary to a campaign for a hospital (Fig. 35).

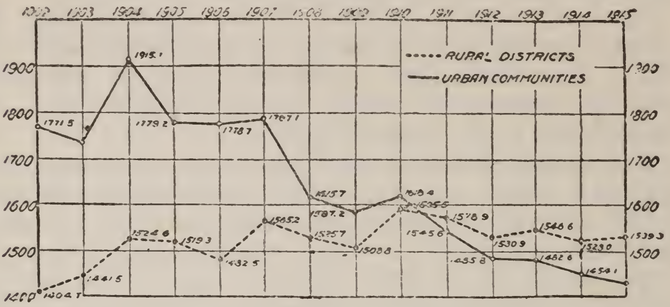

Fig. 35. The rural and the urban death rates in New York State (communities with a population less than 8,000 classed as rural).

Meyer suggests that the rural hospital can never fill quite the field of the city hospital and it should not undertake to develop along the lines of the latter. "It should be above all else an educational institution through which the community may be taught the funda-

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(6) Jour. Amer. Med. Ass'n., April 19 to May 17, 1919.

mentals of hygiene and right living. It may be made a useful mechanism in surveying community conditions and needs in matters of health and sanitation.''

The first step in determining the need of a hospital is to discover the extent of sickness and resultant disability. Meyer summarizes the results of a dozen or more surveys made in different parts of the country in city and in country by saying that the sickness rate of the country varies from 20 to 25 per 1,000 and the disability rate due to sickness 16 to 20 per 1,000. When minor illnesses are taken into consideration the rate runs between 40 and 70 per 1,000 (Fig. 36).

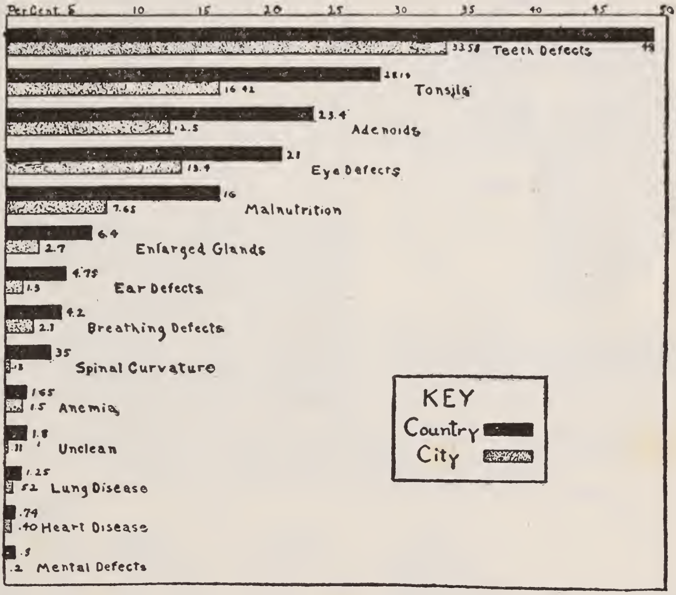

Fig. 36. City and country death rates (through the courtesy of Dr. Thomas D. Wood, Teachers' College, Columbia University).

The surveys taken into consideration in making this summary are: Federal morbidity surveys of Boston, Rochester, Chelsea, Kansas City, North Carolina, Trenton, Pittsburgh, West Virginia, Pennsylvania, New York

Charities Aid in Dutchess County, New York, New York City Health Department and Framingham, Mass.

Meyer says that there is much reason to believe that the rural sickness rate exceeds that of the cities and also that health defects appear to be far more common among country than among city children (Fig. 37).

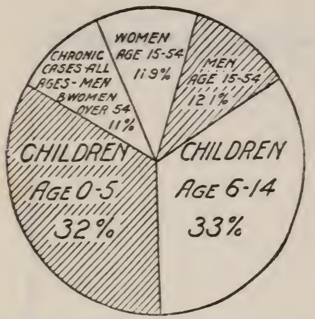

Fig. 37. Days lost through sickness, classified by age of the sick.

Of the total loss of time due to sickness 65 per cent. is occasioned among children under 14 years of age, 24 per cent. is among men and women 15 to 54 years of age and 11 per cent. is in persons over 54. The loss of wages on account of illness averages 6.7 days *per annum, per capita.* About 40 per cent. of the population is gainfully employed. The average margin between economic dependence and inde-

TABLE 1.—RELATION OF SICK AND DISABLED TO TOTAL NUMBER OF PERSONS INVESTIGATED, TOGETHER WITH THE DISABILITY RATES PER THOUSAND PERSONS INVESTIGATED, CLASSIFIED BY SEX

Area	Persons Investigated*	Persons Sick		Persons Disabled		Disability Rate per 1,000 Investigated 15 and Over	
		No.	Rate	No.	Rate	Male	Female
Boston	97,259	1,902	19.6	1,747	18.0	21.6	21.8
Rochester	34,490	798	23.1	661	19.1	23.2	25.7
Chelsea (N. Y. C.)	24,043	356	14.8	331	13.8	17.6	14.7
Kansas City, Mo.	34,267	862	25.2	816	23.8	23.5	26.1
North Carolina	66,007	1,881	28.5	1,512	22.9	25.1	35.3
Trenton	6,971	180	25.8	139	20.0	24.8	23.1
Pittsburgh†	115,618‡	1,869	16.2	1,791	15.5	20.2	18.3
West Virginia†	41,246	1,363	33.0	1,284	31.2	30.9	40.4
Cities in Pennsylvania and West Virginia	374,001	7,333	19.6	6,908	18.5	23.3	22.5
Total	637,038§	13,312§	20.8	12,114§	19.1	22.7‖	24.1‖

* This column represents the total number of inhabitants concerning whom information was collected in the surveys.

† The figures for Pittsburgh and West Virginia are also included with the figures covering cities in Pennsylvania and West Virginia, given elsewhere in this table.

‡ Statistical results of this sickness survey limited to white persons only.

§ Figures for Pittsburgh and West Virginia are not included, as they are contained in the total given for cities in Pennsylvania and West Virginia.

‖ Arithmetical mean for the cities indicated.

TABLE 2.—SICKNESS AND DISABILITY RATES PER THOUSAND POPULATION AS DEVELOPED BY SURVEYS INCLUDING 13,312 CASES OF SICKNESS IN THE AREAS INDICATED

	Sickness						Disability					
	Both Sexes		Male		Female		Both Sexes		Male		Female	
Area	All Ages	Over 15	All Ages	Over 15	All Ages	Over 15	All Ages	Over 15	All Ages	Over 15	All Ages	Over 15
Rochester	23.1	29.3	21.4	27.3	24.8	31.2	19.2	24.5	17.8	23.2	20.4	25.7
Boston	19.6	24.0	19.9	24.3	19.5	23.8	18.0	21.7	18.1	21.6	18.1	21.8
Chelsea (N. Y. C.)	14.8	...	...	...	...	...	13.8*	16.1	14.9†	17.6	12.8†	14.7
Kansas City, Mo.	25.0	...	...	...	...	...	23.9	22.5	23.7	21.7	24.1	23.2
Pittsburgh	16.2	20.2	16.8	21.2	15.5	19.3	15.5	19.2	16.1	20.2	14.9	18.3
N. Carolina	28.6	37.1	25.1	31.4	32.6	42.8	22.6	29.9	19.9	25.4	25.7	34.0
Pa. and W. Va.	19.4	24.3	19.7	24.9	19.0	23.7	18.2	22.6	18.6	23.1	17.9	22.2
Trenton	25.8	31.6	25.5	33.0	26.1	30.3	19.9	23.9	19.5	24.8	20.4	23.1

* Black and white races. The rate among the white was 13.6, among the colored, 15.4.

† Black and white races.

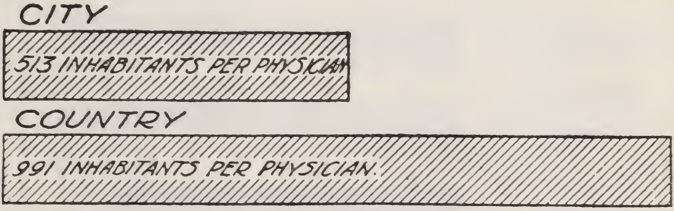

Fig. 38. A comparison of medical service available in city and in country.

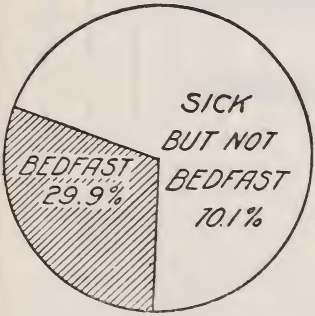

Fig. 39. Number of bedfast among the sick.

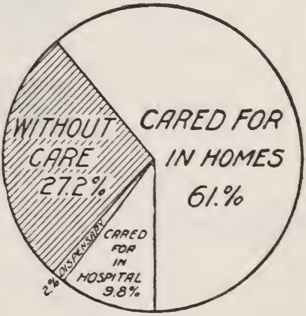

Fig. 40. How 13,132 cases of sickness were found to be cared for (Metropolitan Life Survey).

pendence in families which earn less than $800 is about equal to a week's wages. Since the average loss of time *per capita* annually from illness is between six and

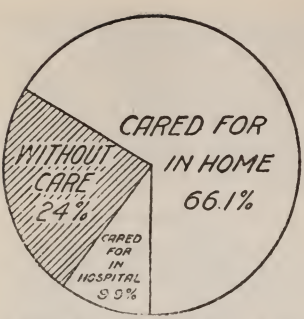

Fig. 41. How 1,600 cases of sickness were found to be cared for (State Charities Aid Survey).

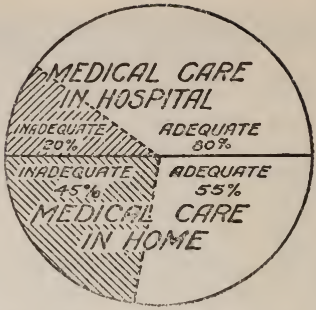

Fig. 42. The large proportion of the sick who are inadequately cared for.

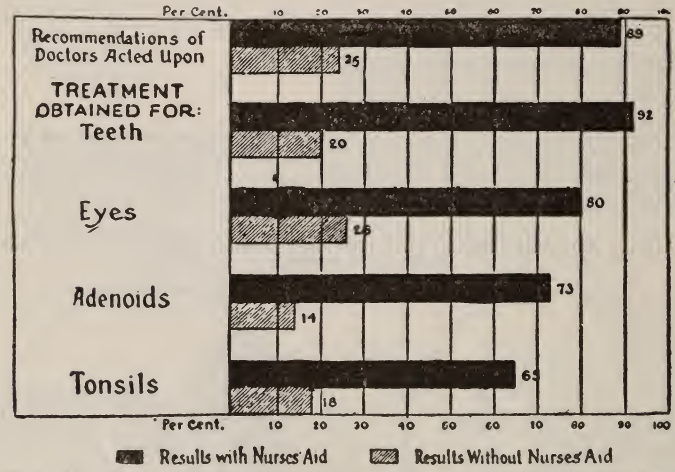

Fig. 43. How follow-up work by nurses increases the value of the physician's advice. (Through the courtesy of Dr. Thomas D. Wood, Teachers' College, Columbia University.)

TABLE 3.—HOSPITAL FACILITIES

	Number of Persons		
Division	Treated per 100,000 Population	For Every Hospital and Sanatorium	Population per Physician
New England states........	6,023	28,244	564
Middle Atlantic states......	3,564	38,631	619
Pacific states	2,911	36,775	435
Mountain states	2,405	23,725	537
East North Central states..	2,163	48,028	576
West North Central states..	1,554	45,461	573
South Atlantic states.......	1,293	63,186	795
West South Central states..	844	125,493	608
East South Central states..	568	135,644	690

TABLE 4.—PROPORTION OF BEDFAST

Area	Total Sick	Bedfast	
		Number	Per Cent.
Boston	1,902	326	17.1
Pittsburgh	1,869*	472	25.3
Rochester	798	220	27.6
Chelsea	356	129	36.2
Kansas City	862	279	32.4
North Carolina	1,881	537	28.4
Pennsylvania and West Virginia	7,333	2,437	33.1
Total	13,132	3,928	29.9

* The Pittsburgh total is included also in the figures for Pennsylvania and West Virginia.

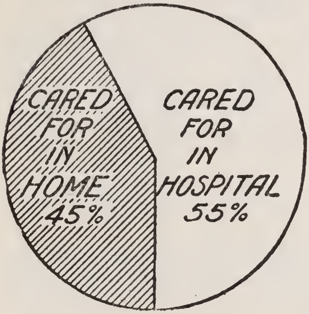

Fig. 44. How cases of typhoid were found to be cared for.

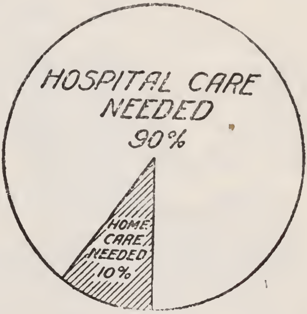

Fig. 45. How cases of typhoid should have been cared for.

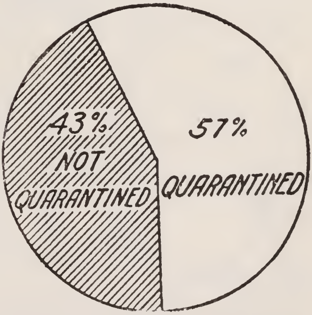

Fig. 46. The large proportion of cases of measles that were not quarantined.

twelve days, the dependence due to sickness is great (Tables 1 and 2).

The number of physicians graduating in 1918 was 2,807. This is about enough to take care of the deathrate in the profession. It does not furnish any to take care of the increase in population — 2.5 per cent. a year. Therefore, before long we may expect a shortage of physicians. However, in 1918 there was one physician to each 712 persons, more than twice the ratio existing in Europe. Between 1870 and 1910, the population increased 138 per cent., but the number of physicians increased about 153 per cent., but that rate of increase of physicians has not been maintained recently (Figs. 38, 39 and 40). The country has only about half as many physicians as the city and this disproportion is increasing. On the other hand, telephones, good roads and automobiles have increased greatly the physician's range of personal service (Figs. 41, 42 and 43).

TABLE 5.—MEDICAL CARE OF THE DISABLED

Area	Disabled	Not Cared for	Cared for		Nature of Care					
					Hospital		Home		Dispensary	
			No.	%	No.	%	No.	%	No.	%
Boston	1,747	442	1,305	74.7	336	25.7	816	62.5	153	11.7
Rochester	661	239	422	63.8	85	20.1	337	79.8		
Chelsea	331	76	255	77.0	56	22.0	166	65.0	33	12.9
Kansas City.....	816	252*	564	69.1	45	8.0	512	90.7	7	1.2
Pittsburgh	1,791	418	1,373	76.7	200	14.6	1,164	84.8	9	0.6
Pa. and W. Va..	6,908	1,725	5,183	75.0	601	11.6	4,527	87.5	55	1.0
North Carolina..	1,512	519	993	65.7	46	4.6	947	95.3		
Total†	11,975	3,253	8,722	72.83	1,169	13.4‡	7,305	83.63	248	2.84

* Other figures for Kansas City refer to sick; not to disabled.

† Excluding Pittsburgh.

‡ The percenage given in this table for cases of sickness cared for in hospital (13.4) is based on the number cared for. Figure 6 includes both the disabled cared for and not cared for; the percentage of hospital care therein shown (9.8) necessarily was based on the total number of disabled: hence the apparent discrepancy.

TABLE 6.—POPULATION AND NUMBER OF PERSONS ILL ACCORDING TO AGE AND COLOR. AND RATES PER THOUSAND PERSONS IN EACH GROUP

Ages	Population			Number of Persons Ill						
	White	Negro	Total	White	Rate	Negro	Rate	Total White Negro	Rate	Second Illness Census
Under 1 year...	308	670	978	4	13.0	19	28.3	23	23.5	31.2
1 to 4.......	1,307	2,126	3,433	15	11.5	41	19.3	56	16.3	22.0
5 to 14.......	2,897	3,688	6,585	50	17.2	71	19.2	121	18.4	15.7
15 to 24.......	3,556	6,451	10,007	32	9.0	118	18.3	150	15.0	10.0
25 to 44.......	6,716	20,189	26,905	91	13.5	575	28.5	666	24.7	26.2
45 to 64.......	3,457	3,660	7,117	131	37.9	166	45.3	297	41.7	61.1
65 over	588	392	980	48	81.6	44	112.2	92	93.8	135.6
Unknown	179	492	671	..	...	..	...	..	...	....
Total	19,008	37,668	56,676	371	19.4	1,034	27.5	1,405	24.8	24.5
Rate corrected for age	.....	.....	.....	...	18.2	....	28.4	....	25.0	28.4

The accompanying tables show the proportion of physicians to population and hospital beds to population in different sections of the country (Tables 3 and 4, and Figs. 44, 45 and 46).

Meyer says that it would seem that a large proportion of the sick, no matter where found, whether in city or country, receive no medical care. In the Metropolitan surveys 27.2 per cent. of those disabled by sickness had no medical care. Only 9.8 per cent. of those disabled by illness were cared for in hospitals (Tables 5 and 6).

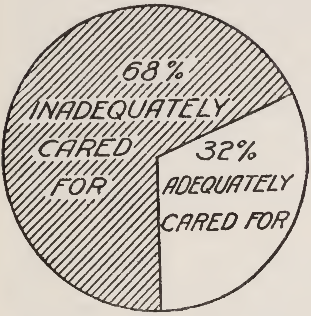

Fig. 47. The large proportion of cases of measles that were inadequately cared for.

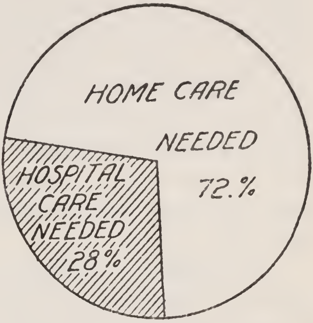

Fig. 48. The proportion of hospital and home care needed by 1,600 cases of sickness.

In one survey it was found that four out of ten persons did not get care of the kind they needed. Half of those cared for in homes and 20 per cent. of those cared for in hospitals were inadequately cared for. Certain statistics as to the care given in certain diseases appear in the diagrams (Figs. 47 and 48, and Table 7). Hospital care not only renders curative service, but in numerous ways serves to prevent the spread of communicable disease. Hospitals in still other ways are a part of health campaigns.

TABLE 7.—PROPORTION OF HOSPITAL AND HOME CARE NEEDED

Proper Place for Medical Care	Number of Cases	Per Cent.
In hospitals	442	28.0
In homes	1,158	72.0
Total	1,600	100.0

National Health Department for Great Britain.[7]

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(7) Medical Officer, Feb. 22, 1919.

Probably there has been no more significant occurrence during the year than the introduction into the House of Commons of a bill for a Ministry of Health by Dr. Addison of the Local Government Board. The introduction of the bill as a measure for the improvement of the health of the people of Great Britain has the enthusiastic support of Lloyd George. The significance of the matter is not limited to its effect on affairs in Great Britain. Canada speedily took up a bill consolidating the health work done in that country and several members of our Congress followed suit by bills providing for a national department of health in the United States. The British bill will no doubt undergo changes before it passes. The following are the essential features of the bill as introduced:

"A Ministry of Health is established. This is to be presided over by a Minister of Health appointed by the King. Among the duties are to take all such steps as may be desirable to secure the effective carrying out and coördination of measures conducive to the health of the people, including measures for the prevention and cure of diseases, the treatment of physical and mental defects, the collection and preparation of information and statistics relating thereto, and the training of persons engaged in health services."

The second principal effect of the bill is the transfer of functions now located in other places to the new ministry. Among these are all the powers and duties of the Local Government Board; all the powers and duties of the Insurance Commissioners; all the powers of the Board of Education with respect to the health of expectant mothers, and nursing mothers, and of children who have not attained the age of 5 years and not in attendance in schools recognized by the Board of Education; all the powers of supervising the administration of the Children's Act.

The bill also provides for future transfer of medical inspection and treatment of children and young persons from the Board of Education. All the powers and duties of the Minister of Pensions with respect to the health of disabled ex-soldiers and ex-sailors, all the powers and duties under the Lunacy Law and any other powers and duties in any government department which in the opinion of the King relate to matters of health.

There is provision for consultive councils of men consisting of persons having practical experience in the matters referred to the council.

The law also provides for the transfer from the Ministry, at the option of the King, of matters not of health interest. Among these are public libraries, museums and gymnasiums, fire engines, the use of heavy locomotives on highways—matters carried into the ministry by reason of present groupings but which obviously do not greatly concern health.

[The bill is being considered by medical societies and other organizations in all parts of the empire. It will be changed in many particulars no doubt. But there is little doubt of its ultimate passage as amended. While the war has contributed greatly to this result, there is no question but that the health insurance act of 1911, by making plain the economic aspects of illness, gave impetus to a national health department; in fact, such is a natural next step.—Ed.]

Physical Standards. Lloyd George in advocating a national department of health for Great Britain said that the results of the draft examinations in Great Britain were appalling. He asked the Minister of National Service how many more men he could have put into the fighting ranks if the health of the country had been properly looked after. He was staggered by the reply—it was a considered reply and it was "at least one million." With these introductory quotations Arthur Keith[8] introduces an argument for anthropometry as a health measure. A recommendation in favor of anthropometry was made by a royal commission after the Boer War, but the recommendation was never acted on. In Great Britain the physical examination corresponding to our draft examination divides all men into Grades I, II, III and IV.

Keith proposes that men between 20 and 31 years of age be graded from the military standpoint into: Grade

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(8) Jour. State Med., February, 1919.

I, men fit to stand the strain of field service; Grade II, men fit for less strenuous military work; Grade III, men unfit for any form of active physical employment; and Grade IV, men who are totally unfit from the physical standpoint.

In a healthy normal population out of each 1,000 men, or from 20 to 31 years of age, there should be 700 of Grade I, 200 Grade II, 75 Grade III and 25 Grade IV. In many industrial towns the grading is about as follows: Grade I, 190; Grade II, 270; Grade III, 410; Grade IV, 130.

One revelation of this experience is the degree of decadence ensuing with age. The tendency of Grade I men to fall into lower grades proceeds at a slow and almost uniform rate until 40 is reached, the pace then increases and at 46 a slump sets in so that at the age of 51 scarcely a single representative of Grade I is left in the manhood of an industrial population. The wear and tear of time amidst the conditions of modern life exhaust the health and strength of the body to a greater extent than is thought.

In many industrial towns in Great Britain the men examined were found to grade as follows: Grade I, 190; Grade II, 270; Grade III, 410; Grade IV, 130.

Specifically, Keith advocates the establishment of fitness rates for adults and growth rates for children, and efforts to maintain such proper rates as a corollary to our efforts to hold down sickness and death rates. Men should be measured for standing and sitting height, weight, span and diameter of chest and head. The condition of their mouths, noses and vital organs should be determined. The rate of growth of children should be observed.

Directorates of Hygiene in British Army. An editorial in the *Medical Officer*[9] gives the information that directorates of hygiene and pathology have been created in the British Army Medical Corps. This making of the sanitary and hygiene service into a separate bureau is expected to add greatly to the attractiveness of the army

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(9) May 17, 1919.

for men trained in preventive medicine. In addition, there is to be an advisory committee of the directorate of hygiene. This is to be composed of civilians and it is planned in this way to link up the work of disease prevention in the army with that in civil life.

One member of the commission is to be a member of the staff of the Local Government Board, one a civil professor of hygiene, and a third the medical officer of some county or great town.

Federal Health Department. J. M. Banister[1] expects that one of the later results of the great war will be a Department of Public Health with a secretary at its head ranking as a member of the President's cabinet.

Reports of the Provost Marshal. The health authorities of the country will do well to study the reports of Provost Marshal General Crowder[2] on the results of the physical examination of the drafted men. The final reports are not yet available but there is available the "Report of the Provost Marshal General on the First Draft," dated Dec. 20, 1917, and a similar report on the second draft dated Dec. 20, 1918.

For the first draft almost 10,000,000 men registered. Of this number 2,510,706 were examined by the draft physicians. Of these, 730,756 or 29.11 per cent. were rejected on account of physical disability. Of those accepted by the draft boards, an additional 5.8 per cent. were rejected upon physical examination by military surgeons at the camps. Thus the total percentage rejected was 34.81 per cent.

Selecting a group of cities and comparing the results of the examinations of the drafted men from those cities and comparing them with the drafted men from certain rural districts the conclusion arrived at was that there is "virtually a tie for the country boy and the city boy." Of the city boys 28.47 per cent. were rejected by the draft physicians; the percentage of the country boys rejected was 27.96.

The ranks of the various states were:

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(1) Nebr. Med. Jour., May, 1919.

(2) Rep. Provost Marshal General, First Draft, Dec. 20, 1917.

		Per Cent.
1.	South Dakota	14.13
2.	Nebraska	20.15
3.	Wyoming	21.53
4.	Idaho	21.58
5.	Oklahoma	22.03
6.	Iowa	22.18
7.	North Dakota	22.45
8.	Kansas	22.78
9.	Montana	22.79
10.	Texas	23.76
11.	Alabama	24.02
12.	Minnesota	24.06
13.	Arizona	24.71
14.	Utah	24.78
15.	Washington	25.71
16.	Oregon	25.74
17.	Illinois	25.83
18.	Ohio	26.08
19.	California	26.17
20.	Wisconsin	26.57
21.	Michigan	26.59
22.	Mississippi	26.80
23.	Indiana	26.80
24.	Missouri	26.81
25.	Florida	27.83
26.	District of Columbia	27.83
27.	Colorado	28.05
28.	South Carolina	28.31
29.	Arkansas	28.35
30.	New Mexico	28.62
31.	Virginia	28.79
32.	Tennessee	28.93
33.	Georgia	29.65
34.	North Carolina	29.78
35.	Maryland	29.93
36.	Louisiana	30.24
37.	Nevada	30.24
38.	New York	30.53
39.	New Jersey	30.93
40.	Kentucky	31.36
41.	Rhode Island	32.73
42.	Delaware	33.6
43.	Massachusetts	35.48
44.	West Virginia	36.98
45.	New Hampshire	38.70
46.	Maine	42.57
47.	Vermont	43.82
48.	Connecticut	46.3
49.	Pennsylvania	46.67

A study of the cause of 10,000 rejections made by camp surgeons in eight camps shows the causes to have been as follows:

	Per Cent.
Alcoholism and drug habit	77
Physical undevelopment	4.06
Teeth	8.5
Blood vessels	1.86
Bones	2.96
Digestive system	.8
Ear	5.94
Eye	21.68
Joints	3.37
Muscles	.64
Respiratory system	1.56
Skin	1.15
Flat foot	3.65
Genito-urinary, non-venereal	1.39
Genito-urinary, venereal	4.27
Heart disease	5.87
Hernia	7.47
Mental deficiency	4.53
Nervous disorder, general and local	3.77
Tuberculosis	5.37
Under weight	1.59
Ill-defined	.91
Not stated	7.89

It must be remembered that these rejects had previously been passed by the draft boards. To get very illuminating figures these must be combined with the figures of the different causes of rejection by the draft boards. Most of those having venereal disease and flat feet were accepted, since these diseases and this condition of themselves were not causes for rejection.

Provost Marshal General Enoch Crowder,[3] in reporting on the second draft, dated Dec. 20, 1918, says that in all 24,234,021 men registered for the various drafts. In the drafts after the first 3,208,448 men were physically examined, of whom 70.41 per cent. were found physically qualified and 29.59 per cent. were rejected in whole or in part. It will be remembered that after the first draft the men were divided into Class A—acceptable; Class B—temporarily rejected for remediable de-

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(3) Rep. Provost Marshal General on second draft, Dec. 20, 1918.

fects; Class C—accepted for limited service; Class D—unconditionally rejected.

The 29.59 per cent. were divided into: Class B, 2.76; Class C, 10.58; Class D, 16.85. To this figure must be added 8.10 per cent. transferred from Classes A and C to Classes B and D as a result of physical examination by the army examining surgeons located at the camps. This makes 37.69 per cent. of the second draft found definitely below standard. A small percentage of these were placed in Group B (capable of remedy without great exepnse of money or time). Almost two-fifths were capable of limited military duty and more than three-fifths were incapable of any form of military service.

A comparison of a large group of city boys with a group of country boys under conditions as fair as possible showed that the country boys were generally in better physical condition. The average percentage of rejections of the combined groups was 19.28. Of the country boys, 16.89 per cent. were rejected, while the city boys had a rejection rate of 21.68 per cent.

The comparison between whites and blacks is not so easily interpreted. In the groups analyzed, there were 458,838 blacks and 2,749,608 whites. Going into Group A were 74.6 per cent. of the blacks and 69.71 per cent. of the whites—a result greatly in favor of the blacks, but the difference was absorbed by the greater percentage of the whites going into Class C—11.34 per cent. as compared with 5.99 per cent. for the blacks. In Class B, there were 2.87 per cent. of whites and 2.09 per cent. of blacks. In Class D the whites had 16.08 per cent. and the blacks 17.32 per cent.

A comparison of Americans and persons of foreign birth shows results distinctly favorable to the Americans. The average percentage of rejections for the two groups was 15.25. The rate for the American born was 13.64 per cent. and that for the foreign born was 17.14 per cent.

The Provost Marshal notes that a local draft board located in the Museum of Natural History in New York City made somewhat complete anthropometric observations on the men examined by them. No part of the findings of this board are contained in this report, but the notice should cause those interested to be on the lookout for the complete report.

An interesting part of the report is the cause for rejection in a group of 255,000 men rejected by the draft examiners, 172,000 rejected by the camp surgeons upon the routine camp re-examination, and 40,000 discharged for physical disability after having served a short while in the army, but not as a result of disability contracted while in line of duty. The total number of rejections was divided as to cause on a percentage basis as follows:

	Per Cent.
Alcoholism	.43
Bones and joints	12.35
Developmental defects	8.31
Digestive troubles	.53
Ears	4.38
Eyes	10.65
Flat foot (pathologic)	3.87
Non-venereal genito-urinary disease	1.35
Venereal genito-urinary disease	1.33
Heart and blood-vessels	13.07
Hernia	6.04
Mental deficiency	5.24
Nervous and mental diseases	5.07
Tuberculosis of the respiratory organs	8.67
Non-tuberculous diseases of the respiratory organs	1.67
Skin	2.68
Teeth	3.16
Thyroid	1.76
Tuberculosis of other than respiratory organs	8.8
All other causes	3.06
Cause not given	5.44

In considering all questions relating to cause of rejection one must bear in mind that all decisions are on the basis of the regulations. In consequence, the report only means what it says. For instance the number rejected for venereal disease is only the number so affected as to come under the regulation in such a way as to cause rejection. The actual number of cases of venereal disease was entirely different.

Of 429,694 rejections 2,007 were due to drug addiction. An analysis of 556 drug addicts showed that 311 used morphine alone, 118 heroine alone, fifty-four used two or more drugs and only one used cocaine.

Of all rejections 2.15 per cent. were due to disease of the thyroid. Of 3,697 cases analyzed, 680 had simple goiter, 2,599 had hyperthyroidism, 418 had goiter with hypothyroidism. A study of the distribution of goiter by states and districts is interesting though the smallness of the number of cases on which calculations are based must be taken into consideration. It is also necessary to remember that the total ratio of prevalence for all ages and both sexes may not be the same as for men of draft age.

The states having rejection rates of over 4 were:

District of Columbia	4.6
Wisconsin	4.6
Idaho	4.

States with rates of 3 to 4:

Missouri	3.9
West Virginia	3.6
South Dakota	3.5
Washington	3.2
Michigan	3.1
Pennsylvania	3.9

States with rates of 2 to 3:

Virginia	2.8
Illinois, Ohio and Oregon	2.7
Minnesota, Montana and Utah	2.2
Kansas	2.1
North Dakota	2.

States with rates of 1 to 2:

Vermont, Wyoming, Delaware and New York	1.8
Indiana, Iowa and New Jersey	1.7
Maryland and Colorado	1.4
Nebraska	1.2
Tennessee	1.

States with rates under 1:

New Mexico	.9
Kentucky	.8
Connecticut	.8
North Carolina	.7
South Carolina	.7
California	.6
Georgia and Oklahoma	.6
Louisiana, Mississippi and Rhode Island	.5
Alabama, Arizona and Maine	.4
Arkansas, Massachusetts, New Hampshire and Texas	.3
Florida and Nevada	.2

The area of relative freedom from goiter and hyperthyroidism comprises New England except Vermont, the South except Virginia and District of Columbia, Nevada and California. The zone of maximum prevalence is the District of Columbia extending into Virginia, and West Virginia, Pennsylvania, Ohio, Michigan, Illinois and the upper Mississippi Valley generally, the Dakotas, Montana, Idaho and the Northwest Coast.

A study of the rejections for pulmonary tuberculosis by states is somewhat interesting:

States having a percentage over 20:

Arizona	34.8
New Mexico	29.8
Colorado	20.2

States ranking under 20 and over the average 8.7:

Kentucky	15.2
Maryland	11.5
California	11.4
Missouri	11.2
Indiana	10.9
Louisiana	10.9
Nevada	10.7
North Carolina	10.4
Texas	10.3
Connecticut	10.1
Kansas	9.8
Mississippi	9.3
Tennessee	9.2
Illinois	9
Virginia	8.8
Arkansas	8.9

The states showing a percentage less than the average tuberculosis rejection rate:

Ohio	8.7
Oklahoma and Oregon	8
Rhode Island	7.9
Massachusetts and Georgia	7.8
Washington and Nebraska	7.7
Florida and Michigan	7.6
South Dakota	7.4
New Hampshire	7.3
Minnesota	7.1
Alabama	6.9
Iowa, Pennsylvania and West Virginia	6.8

Wyoming	6.1
Delaware	6.4
North Dakota	6
South Carolina	5.8
Montana	5.6
New York	5.5
Utah	4.9
District of Columbia	4.4
Idaho	4.3
Maine	3.6
New Jersey	3.3
Vermont	2.1

The very interesting question has been raised: why is there such a prevalence of tuberculosis among the young men of the consumption-resort states. A small proportion of them went West because they had tuberculosis. A much larger proportion were children in families in which there was consumption. It has been suggested that these draft figures may show that the immediate descendants of consumptives are unusually susceptible to the disease. Another explanation offered by some who have noticed the high tuberculosis rejection rate among persons from these resort states is that the large proportion of active consumptives in the population tends to infect an exceptionally large proportion of the young population. The question calls for more study.

Three states stand out as having exceptionally high rates of rejection for disease of the heart and blood-vessels. They are Michigan, 22.8 per cent.; Utah, 21.7, and Washington, 21.4.

Some interest attaches to the percentages of rejection on account of addiction to the use of alcohol and other drugs in the light of statements made in a committee report recently made to Congress. The states having a rejection rate over 1 per cent. on account of this cause were:

Delaware	5
California	1.5
Missouri	1.1
New Jersey	1.2
New York	1.7

[illegible]

All very wet states in 1918.

States having a record of rejections between 0.5 and 1:

Illinois	.7
Oklahoma	.6
Ohio	.5
Rhode Island	.9
Wyoming	.8
Massachusetts	.5
Montana	.5

States having a rate under 0.5:

Alabama	.1
Arizona	.3
Arkansas	.2
Colorado	.4
Connecticut	.3
Florida	.2
Georgia	.2
Indiana	.1
Iowa	.2
Kansas	.3
Kentucky	.4
Louisiana	.1
Maine	.2
Maryland	.2
Michigan	.2
Minnesota	.2
Mississippi	.2
Nebraska	.1
New Hampshire	.1
Nevada	.3
New Mexico	.2
North Carolina	.03
North Dakota	.02
Oregon	.2
Pennsylvania	.4
South Carolina	.1
South Dakota	.2
Tennessee	.3
Texas	.2
Utah	.4
Vermont	.1
Virginia	.1
Washington	.3
West Virginia	.2
Wisconsin	.2

The last group is comprised almost exclusively of states which were dry in 1918.

According to an editorial in the *American Journal of Clinical Medicine*,[4] the causes of rejection at the draft examinations in 1917 and 1918 as reported by the Surgeon-General of the United States Army were as follows:

Venereal diseases	938,232
Heart disease	564,768
Diseases of the ear including defects in hearing	525,600
Diseases of the eye including defects of vision	421,704
Flat feet	346,392
Alcoholism	296,640
Diseases of organs of locomotion	277,128
Hernia	209,304
Diseases of the skin	174,672
Under weight	173,160
Diseases of the respiratory system	156,600
Defective teeth	146,088
Defects of development	132,552
Non-venereal disease of the genito-urinary system	124,992
Varicose veins	90,360
Disease of nervous system except as shown in detail	88,848
General disease except as shown in detail	82,800
Tuberculosis	76,824
Varicocele	48,168
Insufficient chest development	45,144
Disease of digestive system except as shown in detail	43,704
Physical debility	38,880
Curvature of the spine	36,144
Overweight	31,608
Hemorrhoids	22,608
Under height	21,096
Disease of circulatory system except as shown in detail	7,560
Injuries	207,792
Rejected for causes not physical	1,721,304

Studies of the Draft. A. G. Love and C. B. Davenport[5] report the results of the physical examination of the first million men. In all, 5,718,446 men were physically examined up to Sept. 11, 1918. A later report will discuss the physical condition of about two million men accepted, half a million rejected and several scores of thousands accepted but later discharged for disability before seeing service. Of the men examined, 29.1 per cent. were rejected by the draft boards and 5.6 per cent. additional by the examining boards at the camps. The rigidness of the boards varied greatly and comparative conclusions must be taken with considerable allowance.

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(4) August, 1919.
(5) Bull. No. 11, War Dept., Surg. General's Office, 1919.

Some, however, are justified. One is the large number of rejections for goiter among men from the Great Lakes territory and the northwest. About 2.2 per cent. of the rejections were for mechanical defects such as defects in bones and joints, flat foot and hernia. About 15 per cent. were for imperfections of the sense organs and 13 per cent. for cardiovascular defects; 12 per cent. because of nervous and mental troubles, some due to thyroid secretion vagaries; 10 per cent. were due to tuberculosis and severe venereal disease; 8.5 per cent. because of developmental defects and 6 per cent. because of conditions of the skin and teeth. These were the percentages of rejections in this first million. It does not follow that because these rejects were unfit for military service that they were incapable of making a living. About half of the rejects belong to groups that are not fitted for civilian competitions. The percentages of rejection were for selected urban regions, 21.68, and rural regions, 16.89, but the difference is due to the greater thoroughness of the city boards.

[These reports of the Provost Marshal General should be carefully read. Soon more complete analyses of the result of this stock-taking of American manhood will be available. They too should be carefully studied; the welfare of our country demands it.—Ed.]

GENETICS.

England's Future. Dean Inge[6] says that the prevalence of a people is determined not by racial characteristics but by economic circumstances. The war has prevented 12,000,000 births and effected 8,000,000 deaths but the losses may soon be made good. Limitation of births only brings down the death-rate and emigration does not reduce the home population by a single unit. Devices for stimulation of population such as endowment of parenthood, saving babies, and housing reform merely tend to tax the good stocks out of existence for the benefit of the bad. A superior race in a conquered country is generally doomed. Nothing fails like success

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(6) Eugenics Rev., April, 1919.

and the ruling people rule themselves out. The upper and middle classes of today in England will probably disappear in favor of the aristocracy of labor. They in their turn will become exclusive and conservative and will exploit the public for their own profit. It is likely when they have consumed the surplus wealth of the community they will repudiate the burden of maintaining the proletariat. This privileged class being unable to compete with races having lower standards of living will be under-sold in the world's markets. They will restrict their numbers. The trades unionist being allowed to place only one son in his union will take care to have no more. The result will be that England will return to the quiet rural England of 1750 in which the growth of population will be slow.

Effects of War on Racial Stocks. David Starr Jordan,[7] discussing various articles in the recent literature dealing with the effects of the war on racial stocks, says that restoration in quantity is a matter of time. Restoration in quality in values, moral, mental and physical, will be a much longer and more difficult process. Still for a century to come the history of Europe will disclose its failure adequately to conserve the most forceful elements of its population. But as in the long run the strong and intelligent tend to outlast the futile, the dissipated and the lawless we may expect that after this war, as after every war, there will be an ultimate although very tardy recovery.

[The war did not last long enough and was not severe enough to deplete the American stock either quantitatively or qualitatively.—Ed.]

War Losses. F. Savorgnan[8] thinks that his estimate of the dead in the war; France, 1,250,000; Great Britain, 810,000; Italy, 500,000, will not prove to be far from correct.

Abrami gave the following as official for France on Nov. 1, 1918: Dead, 1,071,300; missing, 314,000. If one-half the missing are dead the figure is 1,228,000.

Up to Dec. 10, 1918, the British losses were: dead,

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(7) Jour. Heredity, May, 1919.
(8) Eugenics Rev., April, 1919.

658,704; missing, 359,145. When the dead at sea and an estimate of the dead among the missing is added we get 800,545.

The Italian report gives the dead as 460,000. There are certainly enough dead among those reported missing to bring the figure to 500,000.

Birth Limitation for Germany. Theodore Schroeder[9] attributes the world war to the high birth-rate in Germany and the consequent necessity for expansion. The German birth-rate has been falling dangerously in recent years, but the fall has not lasted long enough to show itself to the comprehension of the man of the street. In 1909, Emperor William recognized it and offered to be the godfather to every eighth child in German families.

Coincident with the fall in birth-rate the emigration rate has fallen, thus depriving the over-crowded country an outlet for its excess population. In the 80's the yearly rate was 136,000. In 1912 only 18,445 emigrated. About fifteen years ago, the German population was increasing from 800,000 to 900,000 a year. Schroeder's remedy for German national aggressiveness is birth limitation.

[Compulsory birth limitation might well have been among the terms of the peace. I do not know how it could have been enforced but, for that matter, some of the present provisions are said not to be enforcible.—Ed.]

Birth Control. Birth control, says C. K. Millard,[1] has come to stay and whether we like it or not we must reckon with it. It is not a symptom of racial decay as some would regard it, but a mark of advancing civilization. Checking the excessive growth of population in fully developed countries constitutes a civilized substitute for those natural but barbarous checks—famine, pestilence and war—which have kept down population in the past; it is a necessary preliminary to the establishment of universal peace. Lastly, if properly used as it should be, birth control by reducing the undue multiplication

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(9) Amer. Med., December, 1918.
(1) Jour. State Med., November, 1919.

of the least desirable classes of the population might be a valuable eugenic instrument capable of greatly improving the quality of the race.

He quotes the following tables from Stevenson's Report to the Birth Rate Commission based on the Census of 1911:

	Births per M married males not 55 years of age	Infant Mortality
Upper and middle classes	110	7.64
Intermediate	132	106.4
Skilled workmen	153	112.7
Intermediate	158	152.5
Unskilled workmen	213	152.5

Fertility rate of certain groups based on number of women of child-bearing age. The fertility rate of the general population being placed at 100:

Coal miners	126.4
Agricultural laborers	113.4
Boilermakers	110.1
Farmers	100.5
Carpenters	95.3
Cotton spinners	91.5
Cotton weavers	81.2
Non-conformist ministers	79.8
Episcopal clergymen	72
Teachers	70.3
Physicians	64.7

Unduly large families have a high infant mortality rate. However, in no group does the infant mortality rate equal to the birth-rate and the inequality is greatest among the poorer people. Therefore, the population is increasing faster in the lower levels than in the higher. Unduly large families produce poverty and poverty causes illness and high mortality rates.

A very high birth-rate causes overcrowding in the house. As the size of the family increases more money goes for food and clothes and there is less left for rent and for medical service.

All in all, Millard thinks that a campaign for birth control, particularly in the poorer classes, should constitute a part of the health campaign. A questionnaire sent physicians indicated that a majority of them hold the use of contraceptives to be harmless from the health standpoint.

Sex Ratio at Birth. S. de Jastrzebski,[2] discussing the sex ratio at birth, concludes:

1. Masculinity at birth is affected by race.
2. Masculinity is higher in legitimate than illegitimate births.
3. Masculinity is greater in rural than in urban populations.
4. Masculinity is greater in first than in subsequent births.
5. The Hopacker-Sadler law is relegated to the limbo of exploded theories.

(This law is that masculinity is greater when the father is much older than the mother and less when the reverse is the case.)

6. War raises the ratio of masculinity.

Reproduction Statistics. At the Bradford (Eng.) Infants' Department 1,721 infants were registered in 1917. An inquiry into the reproductive history of the 1,721 mothers registering these infants made by Helen Y. Campbell[3] showed that 1,244 infant lives had already been lost among their offspring. Of the total number of mothers 557 were bringing up their first children and 512 had lost no children. This means that 652 mothers had lost these 1,244 children. To this should be added 68 children dying during 1917, making 1,312 deaths of children to be divided among 652 mothers, or an average of 2.01 lives per family. Two hundred mothers had lost 252 children among them—1.26 per mother; 369 had lost 524 among them, 220 had had 323 miscarriages among them; 108 had had 145 still births among them. The post-natal loss is twice the antenatal. The 652 families with imperfect reproductive histories had among them 1,626 children—an average of 3.05 per family. The 512 families with perfect reproductive histories had among them 973 living children or 1.9 per family. The high death-rates are in the more

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(2) Eugenics Rev., April, 1919.
(3) Medical Officer, Feb. 1, 1919.

fertile families. The responsibility for this wastage of lives is divided between bad mothering and bad fathering.

Sterilization. Raymond Pearl[4] is not sanguine as to the effects of sterilization of criminals and degenerates. While it is the only means yet suggested which offers anything, no demonstrable results from the policy applied nation-wide can be expected in less than thirty years and it is doubtful if a public sentiment favoring it could be so long maintained. The history of such laws in the United States is that the general public loses interest and the laws fall into desuetude.

PUBLIC HEALTH ADMINISTRATION.

Rating Health Departments. The most successful effort in recent years to improve the local health departments in a state by scoring them on a score card is reported by P. B. Brooks.[5] The form used is as follows:

1.	Communicable diseases—		
	(*a*) Tuberculosis	60	
	(*b*) Other than tuberculosis	60—	120
2.	Laboratory facilities, local or state, fully utilized		80
3.	School inspection		85
4.	Infant and maternal welfare		90
5.	Milk and food inspection		80
6.	Water supply		90
7.	Sewage, garbage, manure		80
8.	Record keeping		90
9.	Public health education		100
10.	Appropriation		100
11.	Enforcement of regulations regarding barber shops, common towels, eating and drinking utensils		20
12.	Special work along new or unusual lines or especially efficient work or good results with old methods		35
	Total		1,000

For purposes of comparison cities were divided into:

First class	Over 175,000 population
Second class	50,000 to 175,000 population
Third class	10,000 to 50,000 population
Fourth class	Under 10,000 population

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(4) Eugenics Rev., April, 1919.

(5) Amer. Jour. Pub. Health, June, 1919.

The method was found not to apply satisfactorily to cities of the first class and cities of less than 20,000.

They have scored seven cities in the second class, forty-two in the third class and ten with fewer than 10,000 population. The average scores were: Second class, 801.5; 20,000 to 50,000, 750; 10,000 to 20,000, 622.5; under 10,000, 565.5.

In New York state, they appointed an inspector, a former mayor, to score the various cities. He took with him the district inspector. They worked with the local health officer and at least two of them signed the report. They then went to the mayor of the city with it and discussed the details. The investigation disclosed that the cost of health work in the cities of 10,000 population averaged about 25 cents *per capita* as compared with 45 cents for the three largest third class cities and 36 cents for the second class cities.

Rating Cities by Infant Mortality Rates. For the seventh time, the New York Milk Committee issues a report on the relative standing of American cities from the standpoint of infant mortality. In 1918, Brookline, Mass., led with a death-rate of 35.4. Other cities having rates less than 50 were: Madison, Wis. (38.1), and Pasadena, Cal. (43.8). The city with more than 500,000 population having the lowest rate was New York (91.7). In the second class cities, 100,000 to 500,000, San Francisco led with 57.2. In this group western cities—Minneapolis, Seattle, Portland, Omaha and San Francisco have led since 1906. In the cities with 50,000 to 100,000 Salt Lake City led with 63.3. The cities of less than 50,000 were led by Brookline. It is noticeable that the average rate grows less each year.

The two factors in reducing an infant mortality rate that are emphasized by the report are: "Clean milk, pasteurized, graded and labelled to show what it is is the only safe milk. Milk is a substitute for other food—no other food is a substitute for milk." The second factor is "First Aid to the Infant." This consists in the instruction and supervision of expectant mothers, popularly termed pre-natal care.

[Of the 167 cities reported on, not more than half have birth registration that is accepted by the U. S. Census Office. The infant mortality rate of these cities is nothing more than a guess. The New York Milk Committee might consider the advisability of limiting its annual table to birth registration states and cities. To do so would promote registration. Aside from that, comparison of crude infant mortality rates is not entirely fair. The climate of the Pacific Coast is unquestionably better for babies, especially the upper section thereof. The preponderance of certain racial stocks makes a difference. Wherever there is a considerable negro population infant mortality rates are high. A considerable Slavic population always results in a high rate. A heavy infusion of Scandinavian stocks, on the other hand, causes the rate to be low. That is one reason for the good showing made by places in Wisconsin and Minnesota.—Ed.]

Rating Cities by Typhoid Rates. The *Journal of the American Medical Association*[6] presents its seventh annual survey of typhoid fever in American cities of 100,000 and over. The cities of the first rank are those with a typhoid death rate of less than 5. The list is as follows:

Chicago, 1.4; Lowell, 1.8; Rochester, 1.9; Paterson, 2.1; Seattle, 2.3; Boston, 2.5; Cambridge, 2.7; Los Angeles, 2.8; Philadelphia, 3; Newark, 3.5; St. Paul, 3.5; Springfield, Mass., 3.6; Camden, 3.6; New York, 3.7; Bridgeport, 3.9; Cincinnati, 4.1; Jersey City, 4.1; Providence, 4.5; San Francisco, 4.6; Worcester, 4.6; Oakland, 4.7; Cleveland, 4.7.

In the cities of the second rank with a rate between 5 and 10 are: Omaha, New Haven, Scranton, Portland, Tacoma, Milwaukee, Indianapolis, Dayton, Hartford, Fall River, Salt Lake City, St. Louis, Minneapolis, Buffalo, New Bedford, Denver, Columbus, Spokane, Syracuse, Trenton, Pittsburgh and Toledo.

In the third rank, 10 to 20, actually 10 to 15, are: Detroit, Grand Rapids, Albany, Washington, Baltimore, Reading, Louisville, Dallas, Kansas City, Atlanta and Memphis.

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(6) April 5, 1919.

In the fourth rank, over 20, are: New Orleans, San Antonio, and Richmond.

The very low rate in Chicago is due to chlorination of the water, pasteurization of the milk and control of cases.

Among cities commended by the *Journal* for satisfactory typhoid conditions is Detroit, which is at last getting its rate down. Baltimore is improving satisfactorily in spite of rather bad sewage conditions, a considerable importation of typhoid from the surrounding country, a heavy negro population and a southern location. Seattle and Los Angeles are likewise reducing their typhoid rates in a satisfactory fashion. Milwaukee continues to chlorinate its water in spite of a good deal of discontent and it is finding its reward in a low rate. New Haven, Fall River, Paterson and Toledo among northern cities and Atlanta and Memphis among southern cities are especially commended. Dallas is applauded, but San Antonio and Richmond are condemned. Richmond's rate rose from 7 in 1917 to 65.3 in 1918.

B. Coli in Water. R. J. Kahn[7] gives in detail the method which he employed in testing 200 waters for *B. coli.* By this method he was able to complete the test in from 36 to 48 hours. The water in dilutions of 10 c.c., 1 c.c. and 0.1 c.c. is inoculated in large lactrose broth tubes with closed end and incubated at 37° C. If no gas forms *B. coli* is held to be absent. If gas forms, straight wire inoculations of typical colonies are made from the glucose to the butt and slant of endo tubes. This is done as soon as gas appears. Gas in the butt and typical colonies on the slant are considered positive evidence of *B. coli.* As a further check, the colonies of supposed *B. coli* are studied as to their morphology and tinctorial qualities. Kahn does not have confidence in the laboratory tests to distinguish between fecal *B. coli* and *B. coli* from other sources.

Gas-Producing Bacilli. The opinion of Winslow, Cohen and various other American observers that the gas-producing bacilli can be divided into two main groups by use of the methyl red and Voges-Proskaner

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(7) Amer. Jour. Pub. Health, May, 1919.

reactions is confirmed by R. Wood.[8] The methyl red + and Voges-Proskaner + types are rare in human and animal feces, more common in surface water, milk and sewage and the precominant type in soil and grain. Wood confirms all of these observations except as to soil and this is under investigation.

He found twenty-nine out of sixty-six samples containing organisms of the M R — type to be from sources of good repute. Organisms of the M R — V P + type are regarded with more disfavor.

Rain Water Safe. A. Houston[9] examined the rain water collected from the roof of his house in London. His intention when he built the storage tank was to use the water to sprinkle his garden and yard. The house is located in an area where there are many birds and he expected a good deal of pollution. He examined nineteen samples of water between July, 1918, and May, 1919. The number of bacteria averaged 1.8 per c.m. and no *B. coli* were found even when 10 c.m. of water were used. So far as his observations go, cistern water is safe except where the cistern is located underground and ground water is permitted to run or seep into it.

County Units. It is the opinion of S. W. Welch[1] that to "sanitate" a town without attending to the surrounding country will result in failure. He says that the county as a unit is the only practical plan.

Ventilation and Contagion. J. Renault,[2] by improving the ventilation of a contagious disease hospital, decreased the death-rate from scarlet fever and measles among the patients sick of those diseases.

The intakes ran into a filter box in the basement. In this chamber the air was filtered through loose wadding. This was changed twice during each winter. From this chamber the intake pipes lead to the wards and discharge behind and through radiators. The warm foul air escaped through Venetian blinds located at the top of the windows. The death-rate among the scarlet fever

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(8) Jour. Hygiene, April, 1919.
(9) Brit. Med. Jour., June 21, 1919.
(1) Southern Med. Jour., June, 1919.
(2) Bull. de l'acad. de méd., May 14, 1918.

patients which before was 7.6 fell after the installation to 0.9. That of measles was cut from 12 to 6.

Mosquito Eradication. B. F. Royer and C. A. Emerson[3] give their conclusions as to the methods employed in mosquito eradication near Philadelphia. They are of the opinion that eradication work will not be satisfactory if it is attempted by one owner, one city or even one county. There must be a wide coöperative movement covering a considerable territory. For mosquito eradication work more power must be given to health departments than they ordinarily possess.

The work in Pennsylvania not only added to the comfort of the inhabitants, but it brought under cultivation large areas of land which for years had remained idle and covered with a luxuriant growth of weeds and water vegetation.

Dynamite in Anti-Malarial Drainage. J. K. Hoskins and W. E. Hardenburg[4] found that the use of dynamite in digging ditches as a part of anti-malarial operations reduced the cost of excavation from 45 to 39 cents a cubic yard. The method is especially adapted to ditching in deep, soft, mucky mud. Two rows of dynamite about 2 feet apart were planted in holes 3 to 4 feet deep and 18 to 20 inches apart. A detonating cap and fuse located near the middle of the section fired one stick and the concussion fired the remainder.

Anopheles Crucians. While *Anopheles crucians* is not so important a vector of malaria as *Anopheles quadrimaculatus* or *Anopheles puntipennis,* nevertheless it is a factor in the spreading of malaria especially near salt marshes. C. W. Metz,[5] by a study of mosquitoes in a swamp near Montgomery, Ala., established the fact that this mosquito bred in water strong in mineral matter. A ditch filled with effluent from a sulphuric acid factory flowed through this swamp. The acid and other mineral matter in the water was sufficiently strong to kill off small fish, water insects and the larvae of every mosquito except *A. crucians,* but this mosquito bred in

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(3) Amer. Jour. Pub. Health, May, 1919.
(4) Pub. Health Rep., Nov. 22, 1918.
(5) Pub. Health Rep., Dec. 6, 1918.

enormous numbers. It has also been established that this mosquito breeds in water too dirty and too full of decaying vegetable matter to be a fit place for other larvae. The acid in this Montgomery ditch water cut the dead leaves and made them into food fit for crucians larvae. While some of these mosquitoes flew 9,000 feet it was concluded that 7,000 feet was the maximum distance that any considerable number flew and that, therefore, that radius was a fairly safe one for a barrier against mosquitoes. Most of the larvae around houses were found under the floors and near the ground. They seemed to prefer stables and out-houses to human habitations.

Oiling of Water. T. Sollman[6] says that kerosene requires about 0.1 per cent. of asphalt varnish to make it spread well on water. Crude kerosene containing asphalt-like product spread well.

Flies. G. Boye and R. Guyot[7] advise the use of castor oil containing a little croton oil as the best fly poison. They advise two drops of croton oil to each ounce of castor oil. The castor oil can be used alone or mixed with simple syrup or a little sugar. To destroy larvae they advise caustic alkalies or acids, such as cresylol sodic.

A Delousing Method. M. H. Foster[8] has found carbon tetrachloride a satisfactory delousing agent where the heat and the cyanide methods can not be applied. He obtained a 10-gallon tin can, 12 inches in diameter and 19 inches high. He cut off the top of this can and then packed in it one hat, one woolen blouse, woolen breeches, leggings, socks, woolen drawers, woolen undershirt and a woolen shirt—a complete set of soldier's clothes. A soiled shirt containing several hundred live lice was cut in four pieces and distributed throughout the clothing. When the outfit was packed in the can the space was about half occupied. On top of the clothing several layers of blotting paper were laid and on this 25 c.c. of carbon tetrachloride were poured. Several

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(6) Jour. Amer. Med. Ass'n., Nov. 9, 1918.
(7) Ann. de hyg. pub. et de méd. legale, May, 1919.
(8) Pub. Health Rep., Oct. 25, 1918.

towels were placed on the top of this can. This was left for two hours and at the end of that period the can was emptied and the clothing was examined for live lice. None were found. One hour's airing was sufficient to remove the odor of tetrachloride. Nits were not killed. Therefore, for permanent results the method must be repeated at least once. An interval of a week should prove about right.

The cost of carbon tetrachloride needed to disinfect a soldier's outfit is less than 5 cents. The essentials are: (1) An air tight container; (2) twice as high as it is broad; (3) not over two-thirds filled with clothing; (4) about 20 c.c. of carbon tetrachloride for each cubic foot of space; (5) a porous covering; (6) about two hours' exposure.

Milk Control. A report of progress in the matter of control of the milk supply of Geneva, N. Y., is made by R. S. Breed.[9] Geneva is a city of 15,000 inhabitants and is wholly supplied with pasteurized milk. The question with them is not the safety of their milk supply; their milk being safe, they feel free to experiment. Breed attempts to improve the milk supply without having a bacterial standard or farm inspection. He sediments a sample of milk, spreads it, dries, stains and examines directly. Making use of this method one laboratory man can handle 10,000 samples in a year satisfactorily. Checking the method against the bacteriologic method, Breed finds that they agree in 91 per cent. of the samples and he concludes that both are safe methods. He thinks that with certain modifications the sediment method will be found the most satisfactory method of keeping track of a condition of a milk supply.

One advantage that the Breed direct counting method has over the agar plate method is that it gives a better idea as to the kinds of bacteria present and their relative numbers. He has been able to locate within sixteen hours the cause of a high bacterial count. He finds that high counts result from: (1) udders infected with streptococci; (2) poorly washed cans; (3) poorly sterilized milking machines; (4) improper cooling.

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(9) New York State Jour. Med., April, 1919.

The most important factor is streptococci. In his opinion these come from the udder. Sometimes they are due to a demonstrable mastitis and sometimes they are the relics of a mastitis present years before. In most cases they come from a single cow. Pursuing this method it has been possible for Breed to locate this cow and have her removed from the herd.

Breed does not think contamination from dust a factor of any importance in raising the bacterial count. He quotes Ruehle and Kulp as having found that air dust does not increase the bacterial count of milk over 1,000. Five quarts of sterile milk could stand in an open pail continuously receiving rain of 160,000 bacteria a minute for more than five hours before the germ content would reach the 10,000 limit usually placed on certified milk.

He does not think dairy inspection by city inspectors accomplishes anything, and believes this work is better done by the federal and state agricultural departments and that the city will do better to require pasteurization and check the milk as it comes in by laboratory tests.

He refers to a chemical test by J. C. Baker by which milk from infected udders can be detected.

The milk of Geneva is all pasteurized. The farmers are paid an extra price for extra butter fat and also for extra low bacterial counts. The results are satisfactory.

Municipal Pasteurization in a Small City. The method of getting a safe milk supply in Tarboro, N. C., is described by Miller.[1] In this town the total daily sales of milk amounts to 175 quarts. The community put a pasteurizing plant in one corner of the water works and adjacent to the ice plant. In this way they got cheap space, steam power, water and ice and used waste brine and cold water. The community pays the farmer 12 cents a quart and sells by tickets to the consumer at 17 cents. An ordinance was passed licensing milk producers and distributers, setting sanitary standards and compelling pasteurization. There is no pas-

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(1) Pub. Health Rep.,

teurizing plant except the one owned by the municipality.

Control of Pasteurization. M. B. Hopkins and M. L. Kelly[2] found that in Baltimore at least the ordinance requiring the pasteurization was being nullified in some measure by reason of the fact that the bottles into which the pasteurized milk was being put had not been sterilized. They found that it was almost the universal custom to run live steam into bottles as a means of sterilizing them, but as the steam was not under pressure in many instances so far from killing the bacteria it was not even sufficient to warm the bottle.

They examined forty-six apparently clean and supposedly sterile milk bottles by washing the interior with 100 mils of distilled water, culturing the water and estimating the number of live bacteria in the bottle. Nine of the bottles were sterile; 1 contained 1,000 bacteria; 5, 2,000; 1, 3,300; 1, 5,000; 2, 6,000; 2, 7,000; and the remainder ranged from 10,000 to 300 millions; 6 had more than 1 million. As a result of the investigation the Baltimore health department requires the sterilization of all bottles and caps.

S. Solis Cohen,[3] after citing a small group of cases of acute diarrhea in children due to certified milk, advises that bottle-fed babies be given no milk that has not been pasteurized. He brought up his family on pasteurized milk and has had his clientele do the same with their children. Neither scurvy, rickets nor intestinal troubles developed in these children. He does not think the certifying commissions are in position to make good on what they certify. Their control is not absolute enough.

Infectiousness of Milk. There is no longer any question, says V. A. Moore,[4] about the infectiousness of milk from cows having tuberculous udders. He thinks, however, that there is considerable doubt as to the infectiousness of the milk from cows that respond to the tuberculin test but have no clinical evidence of tuberculosis. He holds it to be unwise to reject milk from clinically

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(2) Amer. Jour. Pub. Health, March, 1919.
(3) New York Med. Jour., Sept. 14, 1918.
(4) New York State Jour. Med., April, 1919.

healthy reactors so long as we accept milk from untested herds.

In his opinion, no milk from a herd in which there is a case of foot-and-mouth disease should be consumed by human beings. There is no satifactory proof that cowpox, rabies or actinomycosis is transmitted by milk. The evidence as to whether streptococci from mastitis can cause septic sore throat is contradictory. While milk very frequently contains the organism of infectious abortion there is no proof that human beings are so infected. There is little danger, he thinks, that human beings can be infected through milk with any of the specific diseases of cattle.

In the discussion of Dr. Moore's paper Dr. H. J. Ball cited some facts indicating that milk might spread infantile paralysis.

Infectivity of Diseases. H. W. Hill[5] is of the opinion that the isolation periods of various forms employed by health departments is too long. In a study of 240 cases of whooping cough he found that only 5 per cent. of the cases developed from contact with cases in which the disease had lasted over three weeks and only 2 per cent. when it had lasted more than four weeks. He suggests that an incubation period of four weeks for whooping cough would be reasonably safe.

In a similar study of 151 cases of mumps, he found that most of the cases developed from contacts within the first seven days of the disease; after the second week, cases developed in 4 per cent.; after the third week the disease seemed no longer contagious. He suggests that an isolation period of two weeks would be reasonably safe.

A study of 451 cases of measles showed that only three cases developed among people who had been in contact with cases of measles beyond the fourteenth day of the disease. An isolation period of two weeks is suggested for measles. For German measles an isolation period of one week was proposed.

Probably two weeks is long enough, he thinks, for

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(5) Minnesota Med., March, 1919.

cerebrospinal meningitis and three weeks for infantile paralysis.

On the other hand, he is disposed to advocate a longer quarantine period for scarlet fever. Certainly five weeks is not too long. He has seen children infected by other children in whom the disease had appeared fourteen weeks before. If the tonsils are enlarged or the ears are suppurating, or if the nose is running, the isolation period should not terminate in five weeks. Some physicians hold that the isolation should not be terminated so long as there is enlargement of the lymph glands of the neck.

Shortening the quarantine period will save an aggregate of many thousand days, will make the quarantine less onerous and costly and will promote reporting. The only question is as to the relative safety of the policy.

Prevention of Cross Infections. A. L. Hoyne[6] gets results at the Cook County Hospital contagious disease service that are comparable with those at the Durand in the prevention of cross infections. In the county hospital face masks are not used. For more than four years there has not been a maid, orderly or similar employee who has contracted a contagious disease, and among the nurses and internes the number of infections has been extremely small.

Where aseptic nursing in all of its details can not be carried out the following plan gives good results:

1. Always scrub hands with soap and running water after handling patient; if running water is not at hand wear rubber gloves in handling patient.

2. Have a separate gown to wear for handling each patient.

3. Wherever diphtheria is a possibility have Schick tests made. Summarize all reactors by the T. A. method (toxin-antitoxin).

4. All nurses and physicians serving cases of contagion should have nose and throat cultures twice a month.

5. No nurse with enlarged or infected tonsils should be permitted to serve in a contagious ward.

6. All physicians and nurses making examination of

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(6) Ill. Med. Jour., September, 1918.

the mouth or nose should wear face masks while doing so.

7. All nurses going on such service should serve one month probationary period during which masks are worn.

Sterilization of Blankets. Having found ordinary steam sterilization (12 to 15 pounds pressure) destructive to woolen goods, D. Fulton and K. J. Staniford[7] made use of the following methods for sterilizing blankets:

1. The blankets and woolen garments are hung or placed loosely in trays in the sterilizer.
2. Sixty pounds of steam are introduced into the outer jacket of the sterilizer to prevent subsequent condensation of steam within the chamber.
3. A vacuum is created in the sterilizer chamber to facilitate penetration.
4. Sterilization is performed with either (*a*) steam under no pressure for one hour or (*b*) steam 12 pounds under pressure for ten minutes.
5. A vacuum of from 15 to 20 inches in 1 sterilizing chamber to produce drying.
6. The door of the sterilizer is opened about 4 inches for 10 minutes to allow gradual cooling. It was discovered that it was sudden change in temperature which produced shrinkage.

CHILD WELFARE.

Rates of Growth, Height and Weight. The measuring and weighing campaign of the Children's Bureau is not wholly approved by L. E. Holt.[8] As the result of studies of the height and weight of children, he says: "With such wide variation as those noted both in foreign and in American boys it is evident that weight for age is not of great importance in determining the nutrition of a child."

Nor has he confidence in height for age, saying: "As a guide to a child's nutrition height-age, curves are therefore quite unreliable. These conclusions are based upon several studies.

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[7] Amer. Jour. Dis. Child., December, 1918.

[8] Jour. Amer. Med. Ass'n., Sept. 7, 1918.

A study of 350 well-to-do boys in the Browning School gave the following results:

Age.	Range in Weight.	Mean Weight.	Years Growth.
11	60 to 90	30	5
12	65 to 105	40	5
13	70 to 115	45	5
14	78 to 125	47	4
15	90 to 140	50	3½

These figures are based upon 1174 observations of 350 boys extending over several years. More than one-fourth of the boys were more than 10 per cent. under weight but they were not undernourished.

A similar observation by Bowditch caused him to arrive at similar conclusions:

Age.	Range in weight.	Average.	Years Growth.
5	32- 52	20	5
6	36- 56	20	4
7	40- 60	20	4
8	44- 64	20	4
9	48- 72	24	4
10	52- 76	24	4
11	56- 84	28	5
12	60- 96	36	4½
13	64-108	44	5
14	68-116	48	4
15	84-128	44	3½
16	96-142	46	3

In this observation there were 350 boys in each group. One-tenth of the boys were 17.2 per cent. below the standard. He concludes that weight-age is not a fair index of nutrition.

Holt combined observations made by a number of men in various parts of the country. The total number of students observed was 50,000. The variation is so great in every part of the country that the standard as a basis for determining stage of nutrition is misleading. When it comes to different racial stocks another source of error was introduced. It is not in the nature of the stock for an Italian to be as heavy at 10 years as a Scandinavian is at that age. Growth in height likewise varies. This growth is obedient to inherited growth impulse and is not affected by moderate degrees of malnutrition. The rate of growth as to weight and height combined is the best criterion of the state of health:

BOYS.

Age.	Range in Weight Measure.	Average Weight Increase.	Range in Height Increase.	Average Height Increase.
6– 7	3–5	4	1 to 5 2/5	2
7– 8	3.5–5	4.75	1–5–2/5	2
8– 9	4–6	5.25	1–5–2/5	2
9–10	4–7	6	1–5–2/5	2
10–11	4–6.5	5	1–5–2/5	2.7
11–12	4.5–7.5	6.5	1–4.–2	1.7
12–13	6–9	8	1.3–2	1.8
13–14	8–12	10	2–3	2.5
14–15	10–15	12.5	2–3.5	2.7
15–16	9–15	13.75	2–3.5	2.7
16–17	4–12	4–12	0–5.2	1.2
17–18	4–8	4–8	0–1	.5

GIRLS.

6– 7	3–5	4	1–5.25	2
7– 8	2–5	4.5	1–5.25	2
8– 9	3.5–6.5	5	1.3–2.4	1.75
9–10	4–6	5.25	1.5–2.5	2.25
10–11	4.5–7	6	1.5–2.5	2
11–12	7–11	9.5	2–3	2.5
12–13	8–12	10.5	2–3	2
13–14	7–11	9.5	1.2–2.4	2
14–15	5–10	7.5	0–2	1.25
15–16	3–8	6	0–1	.75
16–17	2–6	3.5	0–5	.5
17–18	0–2	.5	0.0.2	.2

The rate of growth both as to weight and height was greater in summer than in winter, May to November being superior, 1¼ pounds as to weight and 36 inches as to height.

Holt thinks the Dumferline scale which divides children as to nutrition into four classes (good, fair, below and very bad) is helpful if the children examined are stripped and the examiner has had some experience. The best simple guide in fixing the status as to nutrition is the height-weight index. To get this, divide the weight in kilos by the weight in centimeters. This index is lowest at 6 years of age—.15, and highest at 17 years of age—.40; and it increases evenly between these years. In the case of babies, as a rule, the monthly or weekly gain in weight is the only standard that need be applied. It can be assumed that gain in length is progressing unless there is reason to suspect rickets or cretinism.

PERSONAL HYGIENE.

Clothing of Children. The clothing as well as the bodies of 400 children brought to infant welfare stations was weighed by L. W. Sauer[1] in order to get at the customs with relation to clothing. Half the weighing was done in summer and half in winter. Only the clothing worn regularly indoors was weighed. Almost without exception the fabrics were of cotton. In the main the children were not sick. In three children ranging from 1 to 2 2/3 months the weight of the clothing weighed from 460 to 530 grams on a day when the thermometer was 92, and another three children of about the same age wore clothing ranging from 200 to 400 grams a day when the temperature was 26. This was not an average showing, but the rule was that children under three months of age wore about the same weight of clothing summer and winter. Three other children from 4 to 7 months of age wore clothing ranging from 270 to 1090 grams when the temperature was 85° as compared with three of from 5 to 8 months of age whose clothes weighed 460 to 1,000 grams when the temperature was 28. Three children 11 to 15 months old whose clothes weighed 120 to 400 grams when the temperature was 85° were compared with three from 10 to 18 months old whose clothing weighed 300 to 400 grams when the temperature was 22.

A better idea is obtained by studying the averages for all the babies. The babies weighing less than 5 kg. weighed an average of 4.2 kgs. in summer and 4 kgs. in winter. The average weight of the clothing respectively was 365 and 362. The average percentage of clothing to body weight was 8.7 and 9.7. The maximum of clothing weights were 710 and 1,050, the maximum percentages 19.2 and 37.5 and the minimum 2.1 and 5.2.

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(1) Amer. Jour. Dis. Child., July, 1919.

For babies 5 to 8 kg. the figures were: average weights, summer, 6.5; winter, 6.4; average clothing weight in grams 353 and 415; average percentage of clothing weights to body weight were 5.4 and 6. 5. The maximum clothing weights were 1,090 and 1,000; the minimums 100 and 110. The maximum percentages were 19.7 and 15.4 and the minimum 1.5 and 1.8.

For infants weighing more than 8 kilos the figures were: body weights, 9.2 kilos in summer and 9.5 in winter. Weight of clothing, 371 and 463 grams; percentage 4.0 and 4.9. The maximums and minimums were 560 and 1,500 and 120 and 280 respectively. The maximum and minimum percentages were 5.2 and 15.2 and 1.3 and 2.6.

The averages regardless of season were: Up to 3 months, weight of clothing 850 grams; per cent. 31.6; 3 to 6 months, clothing 822; per cent. 19.9; 6 to 9 months, clothing 850; per cent. 15.4; 9 to 12 months, clothing 822; per cent. 13.6; 12 to 24 months, clothing 964; per cent. 12.9.

These figures are somewhat lower than figures given by Griffith to the Section on Diseases of Children of the American Medical Association in 1917.

Clothing for Women. Writing upon fashions as affecting public health, Jeanette Throckmorton[2] says that it was vanity and not comfort which brought dress into being. Having been adopted by reason of this motive it presently was recognized as a means of opening up cold climates hitherto uninhabitable and, lastly, as civilization crept forward it became a symbol of modesty.

In the earlier stages of society the male was the dressy member of the family but the female having learned the art has far outstripped the male as a dresser.

Dr. Throckmorton thinks that females dress too lightly in winter. This induces congestions of the tonsils. pharyngeal and nasal mucous membrane and congestion of the pelvic organs resulting in dysmenorrhea. She quotes Huntington as saying that an atmospheric tem-

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(2) Memphis Med. Monthly, October, 1918.

perature of 64° F. is best for physical activity and 50° F. for mental activity. Our garments are not the best for mechanical reasons as well.

The ordinary corset, she says, tends to produce a straight front; the corset fitting snugly at the hips and loosely above tends to lift the abdominal organs. She quotes Holdthwait as saying that the fascia of the neck attached to the base of the skull at its upper end is attached at its lower end to the pericardium which is attached at its lower end to the diaphragm. The stomach is suspended by its gastric end and also at its pyloric end through the liver and the lesser omentum. Throwing the head backward will raise the stomach from three to four inches. She thinks our profession should discourage the slouching walk and try to set a fashion for a soldier gait among women.

The fashionable shoe pinches the toes together and thus causes bunions and corns. It throws the toes out and thus produces falling of the arch, flat foot and weak foot.

Food in Relation to Intestinal Flora. The intestinal flora is dependent, says J. C. Torrey,[3] upon the diet. It does no good to try to implant *Bacillus lacticus* in the intestines unless the diet is preponderatingly carbohydrate. If it is such, then it is usually unnecessary to implant these bacilli since the acid producers present overgrow the other flora.

The more common bacteria inhabiting the large intestines arranged as to whether they cause fermentation or putrefaction are: *B. acidophilus, B. bifidus, streptococci, B. welchii.*

Fermentation: If carbohydrates predominate in diet, and if carbohydrates do not predominate in diet, *B. coli.*

Putrefaction: *B. sporogenes, B. oedematis, B. putrificus, B. mesentericus, B. proteus, B. pyocaneus, B. fluorescens, staphylococci.*

The fundamental factor is the food. Secondary factors are the rate and degree of digestion. In experiments on dogs it was found that the addition of lactose and dextrin to a meat and rice diet caused *B. acidophilus* to

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(3) Jour. Med. Research, January, 1919.

overgrow and dominate the intestinal flora. This condition of dominance persisted so long as this diet was continued. Maltose and glucose were far less potent in causing the acid overgrowth. A diet of milk and bread was very effective in producing the same result. In this combination bread was more important than milk and milk sugar than casein. Bread and potatoes were effective. Rice was less so. Mammalian meat was most effective in causing an overgrowth of putrefactive organisms. When fish predominated in the diet *B. coli* and *B. proteus* predominated in the intestines. Both, however, were putrefaction producers. Milk protein was less harmful than meat protein, and vegetable protein less than that of milk. The eating of fat did not affect the flora either way.

Canned Foods. One of the most extensive studies of commercial canned goods that has appeared has been made by J. Weinzirl.[4] Working under a grant from the American Canners' Association he had free access to the manufacturing plants and was able to get the facts as to the manufacturing processes. He thinks the employment of the vacuum process fundamentally necessary. He found commercial canned goods not infrequently containing viable microörganisms but most of these existed as spores impossible of further development so long as the container was air tight. In fact, in 23 per cent. of the supposedly good cans some form of bacteria was found.

Of the cans of sweetened condensed milk 83.3 per cent. contained bacteria; plums, 81.8; okra, 71.4; corned beef, 50; peaches, 46.1. These were the poorer records. Among the canned goods getting a better record were: Lima beans, 18.2; asparagus, 16.6; pineapple, 15.4; peas, 15.1; hominy, 14.2; salmon, 11.8, and apricots, beets, sweet potatoes, spinach, oysters and evaporated milk, 0.

He examined 1,018 samples: 17 species of yeast, 29 molds and 392 bacteria were found. *B. botulinus* and *B. welchii* were not found. Bacilli of the colon group cause swelling of the can with decomposition and the formation of bad smelling gases. *B. subtilis* and *B.*

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(4) Jour. Med. Research, January, 1919.

mesentericus were hard to kill and were the varieties usually found.

Botulinus is anaërobic. It produces violently toxic substances. These substances are generally odorless and tasteless. They are destroyed by the heat of cooking. *Bacillus welchii* seems relatively harmless in the intestinal tract and as a contaminator of food. The general conclusion arrived at is that the elements of food poisoning are very rarely or never found in canned goods as they are now marketed.

Yeast as Food. P. B. Hawk, C. A. Smith and R. C. Holder [5] report that they have found dried baker's yeast an excellent food material, palatable, wholesome and nutritious. It contains: protein, 52.41; fat, 1.72; carbohydrates, 37.13; ash, 8.74.

The ash is exceptionally nutritious. It contains three times as many calories as moderately fat beef. Of six men fed on it, four showed an increase in nitrogen. Mixed with hamburger steak, sausages and other meats it makes a palatable and nutritious food. Dried at 105° C. it can be substituted for 20 per cent. of the flour in bread with advantage. It can be used as a substitute for from 10 to 30 per cent. of our ordinary foodstuffs with gain in food values and without impairing the wholesomeness or attractiveness of the diet. The nitrogen of yeast is in better combination than that of meat or wheat. From 1 to 2 grains of nitrogen *per diem* can be taken as yeast with advantage. If the amount reaches 4 grams, diarrhea is caused. Four men taking enough yeast daily to make 4 grams of nitrogen gained in weight from one-half to one pound a week; two lost weight in this amount. Yeast in rather free amounts in bread should prove helpful to persons suffering from constipation.

Growth Substance in Yeast. P. B. Hawk, Fishback and Bergwin [6] found that baker's yeast dried at 105° C. contained a water-soluble growth substance. Due to this vitamine young animals fed on yeast continued to grow.

Dried Orange Juice. It has been found by M. H.

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(5) Amer. Jour. Physiol., March, 1919.
(6) Amer. Jour. Physiol., March, 1919.

Givens and H. B. McClugage[7] that orange juice can be so dried as to prevent scurvy. The best method of drying is one in which the temperature is not too high and the duration of drying is short. A temperature of from 55° to 60° C. for 40 hours destroys some of the antiscorbutic power. The dried orange juice was potent three months after drying. Dried orange juice should be much cheaper than oranges.

The authors quote Check, Hume and Skelton and Check and Rhodes as having determined the relative value of certain antiscorbutics. Lemon and orange were about equal. Lime juice was only one-fourth as active as lemon juice. Lime juice preserved with alcohol and salicylic acid was inactive. Orange juice was ten times as potent as grape juice. Raw carrot juice was a weak antiscorbutic as was raw beet juice.

Givens and Cohen found that dried cabbage was antiscorbutic and Givens and McClugage found the same to be true of dried tomatoes.

Alkalies and the Growth Substance. A. Harden[8] finds that rendering antiscorbutic fruit juices alkaline destroys the desired principle. He therefore warns against cooking fruits and vegetables with alkalies.

Antiscorbutics. A limited outbreak of scruvy in a British workhouse is reported by James Niven.[9] Investigation showed no lack of fats in the diet, but there was a marked deficiency in fresh meat and fresh vegetables. It was recommended that all solid food should be thoroughly chewed. "Meat, poultry, fish, milk, cheese, nuts, peas, beans, lentils and oatmeal furnish food elements in great abundance. The cheapest of these approved foods now are peanuts, peas, beans, lentils, oatmeal, milk and herring. Milk may be used raw by adults, but for children it should be scalded. Peanuts should be partially cooked."

"Fat is needed in sufficient amount. Cheap sources of good fat are herring, margarine, cod liver oil, malt and peanuts. Carbohydrates are especially needed by

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(7) Amer. Jour. Dis. Child., July, 1919.
(8) Lancet, Sept. 7, 1918.
(9) Medical Officer, May 17, 1919.

manual laborers. Among the cheaper sources of carbohydrates are flour, oatmeal, barley, rice and milk.''

The following are antiscorbutics: Cabbage, turnips, carrots, radishes, lettuce, potatoes and fruit. Raw vegetables are more valuable than cooked. The cheapest are radishes and cabbage. Old potatoes boiled in their jackets are excellent.

PREVALENCE OF PREVENTABLE DISEASES IN THE ARMY AND AMONG THE CIVILIAN POPULATION

American Army. V. C. Vaughan and G. T. Palmer[1] continue their report on the communicable diseases of the United States Army begun in the same publication in August, 1918. That article brought the record down to April, 1918. The present article carries the record from that date to January, 1919. The following is a summary of the conclusions of the first report (Figs. 49, 50, 51).

Measles was nineteen times as prevalent in our training camps as in civilian life. The undue prevalence of this disease was especially noticeable in those camps which drew a large portion of their troops from rural populations. Organizations from the larger cities showed no more measles than appeared in the same age groups in the cities from which they came.

The pneumonias were twelve times as prevalent in the camps as in the civilian population. Again, it was the rural and southern soldier who suffered most severely during the winter of 1917-18.

Meningitis was forty-five times more prevalent in the camps than in the civilian population.

Scarlet fever was six times as prevalent in the camps as in civil life. Two camps, Beauregard, La., and Wheeler, Ga., had no cases of this disease. Pike, Ark., had the largest number and it may be well to remark that about one-third of the troops from this camp were from the North.

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(1) Jour. Lab. and Clin. Med., July and August, 1919.

Diphtheria was twice as prevalent in the camps as in civil life.

Tuberculosis was thirteen times more prevalent among civilians than among soldiers. This is due to the elimination of the tuberculous in the examinations of drafted men.

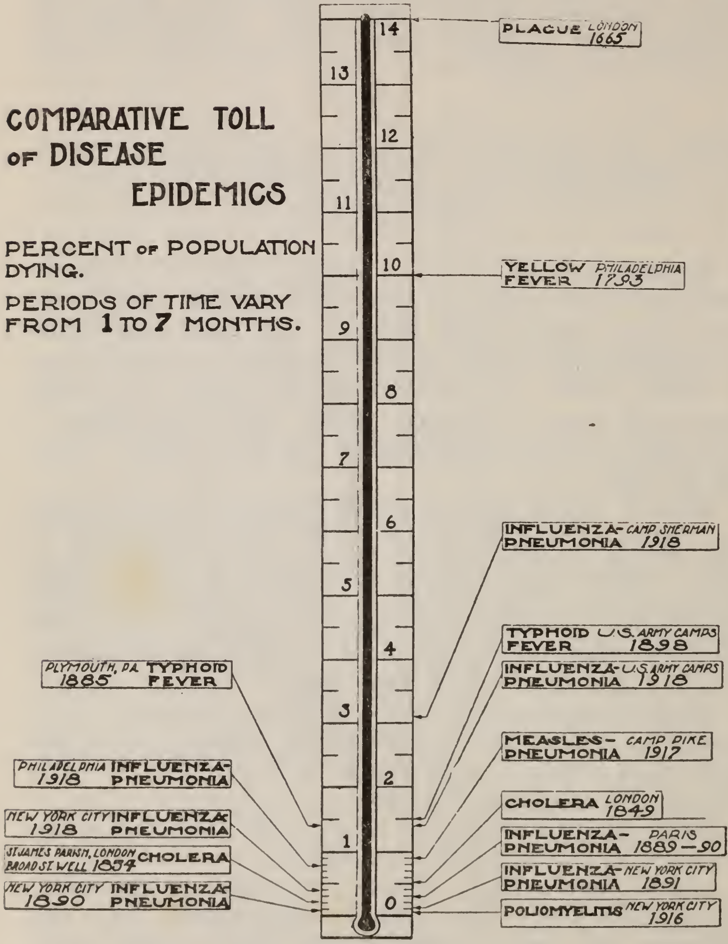

Fig. 49.

Typhoid fever and its allied diseases, including dysentery, were negligible, the annual death rate among all troops in the United States for the six winter months of 1917-18 being 1.3, while that for the state of Delaware for the same period was 55. It may be worthy of note that vaccination for this disease as practiced in the army gives protection against ordinary doses of infection, but the protective effects may be overcome by massive infection.

The following figures show the relative death rates from all causes in the army and in civilian life. The army rate is computed for the six winter months of 1917-18, while the civil rate is that of the corresponding months of 1915-16.

Place.	Annual Death Rate per 1000
Army	9.1
U. S. Registration Area—	
All Ages	14.3
Age 20-49	8.3
Age 20-39	6.8
Age 20-29	5.7

In summing up the entire experience with both armies at home and abroad Vaughan and Palmer find that disease is more prevalent in the home army. The exceptions are dysentery, meningitis and scarlet fever. There is more disease in the home army because the men are more susceptible and this is because it has a greater proportion of new men. The natural susceptibility of the individual is the greatest factor in the causation of disease.

This report must be accepted as preliminary.

The authors also direct attention to the incompleteness of the reports on which some of their figures are based. In some instances they have used the weekly telegraphic reports received at the Surgeon-General's office. In other cases later somewhat more formal reports were used. These at times have been dissimilar. Nevertheless, the statements will eventually be found to be substantially correct.

At the end of 1918, some change was necessary in some of the conclusions. As a rule men in Southern camps had improved in health much more rapidly than the men in Northern camps and the ranking had shifted so that some of the Northern camps were the worst and some of the Southern camps the best. The men had been in camp longer and many boys from rural districts

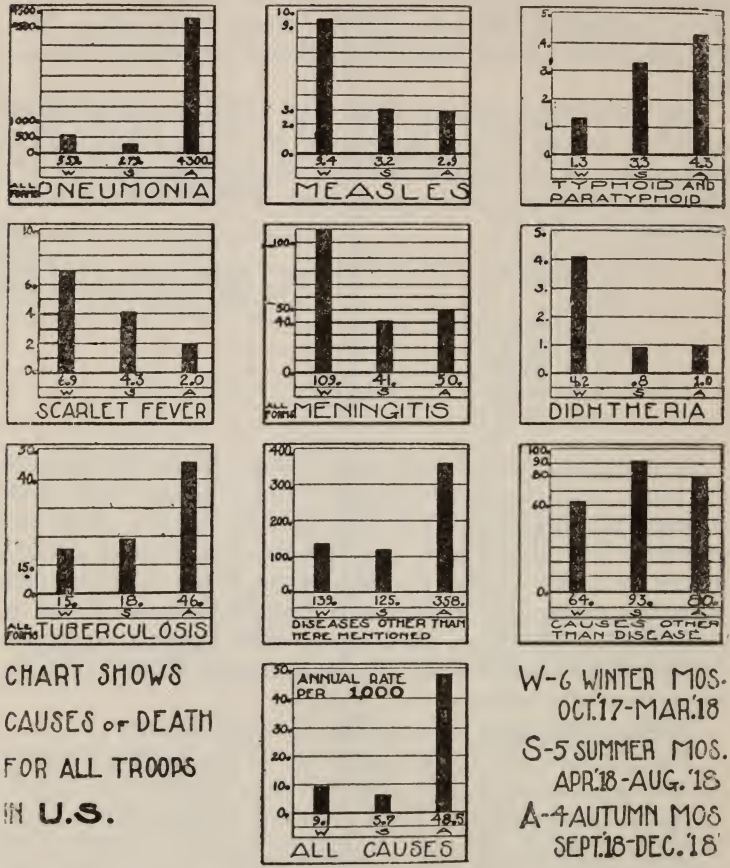

Fig. 50. Deaths in U. S. Army by seasons during 1917-18. Annual rate per 100,000.

had become immunized. The great epidemic of influenza bearing somewhat harder on the North than on the South had swept over the country and the summer season for the first time in American history had gone by without occasioning a material increase in typhoid, malaria, fevers, diarrheas or dysenteries. Some of the more interesting conclusions are these:

Comparing the army abroad and in this country, disease was more prevalent among troops in America. There was more dysentery, meningitis and scarlet fever among troops abroad. There was more disease in the home army because the men were newer and less seasoned and therefore more susceptible. The natural susceptibility of the individual is a greater factor in the causation of disease than is environment.

Of the nearly 4,000,000 men who passed through the army camps from September, 1917, to January, 1919, 30,859 died from disease. Up to November 26, 1918, 16,000 soldiers in France died of disease, making a total of 47,000 dying from disease at home and abroad. Of the 2,000,000 men landed in France 40,000 died in combat, making percentages of 54 and 46 respectively. However, had it not been for the epidemic of influenza another story could have been told.

Comparison of percentages dying from disease in other wars are:

Northern troops, Civil War	66
Franco-Prussian War—French Army	68
German Army	31
Spanish-American War—American Army	84
Russo-Japanese War—Japanese Army	32
Russian Army	29
American Expeditionary Force	29

The annual typhoid rate during the summer was 3.3 per 100,000, but most of the cases were among soldiers just entering the service. Malaria and typhoid fever, once the scourge of armies, are well in hand. Typhus is no longer a scourge, but still requires close watching. Pneumonias remain the greatest cause of death in all armies. Protective inoculation against pneumonia has been tried only recently and the results are promising.

Comparing the health of the soldiers and the civilian population Vaughan and Palmer say: Pneumonia is 9 times greater in the army; meningitis 15 times; scarlet fever, 2.5 times; diphtheria, 1.1; measles, 6; deaths from all causes 1.2 times. Tuberculosis is 8 times greater in civilian life and typhoid 17 times greater.

These statements would not hold true in a year free from influenza-pneumonia and especially not with a seasoned army. Tuberculosis is less prevalent because most of the tuberculous were weeded out by the entrance examination. The great strain of war does not offset the gain from plenty of good food, and a strenuous open air life. Typhoid is less because of vaccination and sanitation. Measles is more prevalent in the army because of the close contact of susceptibles with cases of the disease. Pneumonia is more prevalent because of the exposure of susceptibles to carriers and because cold, exposure and fatigue predispose to the disease. Meningitis is more prevalent because of the enormous multiplication of human contacts in camps.

TABLE 8.—CAUSES OF DEATH

All Troops in the United States. Five Summer Months, Week Ending April 5, to Aug. 30, 1918. Average Strength—1,420,000

Disease	Number of Deaths	Annual Rate per 100,000
Pneumonia	1,679	279.
Diseases other than here mentioned*	665	111.
Meningitis	248	41.3
Tuberculosis	109	18.1
Empyema	86	14.3
Scarlet Fever	26	4.3
Typhoid and Paratyphoid fever	20	3.3
Measles	19	3.2
Diphtheria	5	.84
Total disease	2,857	474.
Causes other than disease**	558	92.8
All causes	3,415	567.

* Includes appendicitis, septicemia, heart disease, nephritis, etc.

** Includes burning, fracture, suicide, gunshot wounds, etc.

(See Fig. 50)

Measles was not very prevalent in 1918, especially in the camps where it prevailed the previous year. Los Casas, a new camp, newly organized and populated by new recruits, suffered from measles much as did the Southern camps the year before. "Where one man without measles has pneumonia two or three (2.6) men with measles will have pneumonia. Measles thus predisposes to pneumonia. Measles thus not only predisposes to pneumonia but it predisposes to fatal pneumonia. Of every 100 men with measles, forty-four have pneumonia and nineteen die. Of every 100 men without measles, seventeen have pneumonia and two die. Thus a person with measles is ten times as likely to die as a person without measles.''

As to meningitis: ''It is evident that few people are susceptible to meningitis. Conveying contact is not limited to close association. After all it is the infected hand and the careless mouth which are responsible for the trouble and these members can operate on the street, in the post exchange, at drill and at play. Until the simple rules of personal hygiene are taken seriously other preventive activities may be considered inadequate.''

TABLE 9.—CAUSES OF DEATH

All Troops in the United States. Four Autumn Months, Week Ending September 6, to December 27, 1918. Average Strength—1,493,000

Disease	Number of Deaths	Annual Rate per 100,000
Pneumonia	21,053	4,300.
Influenza	1,133	232.
Diseases other than here mentioned*	512	105.
Meningitis	244	49.8
Tuberculosis	225	46.0
Empyema	102	20.8
Typhoid and paratyphoid fever	21	4.3
Measles	14	2.9
Scarlet fever	10	2.0
Diphtheria	5	1.0
Total disease	23,319	4,770.
Causes other than disease**	393	80.2
All causes	23,712	4,850.

* Includes appendicitis, septicemia, heart disease, nephritis, etc.

** Includes burning, fracture, suicide, gunshot wounds, etc.

(See Fig. 50)

As to malaria they say: ''The malaria reports have come from men who contracted malaria prior to their entrance into the army. There is little if any evidence that malaria has spread among uninfected individuals in the camps.''

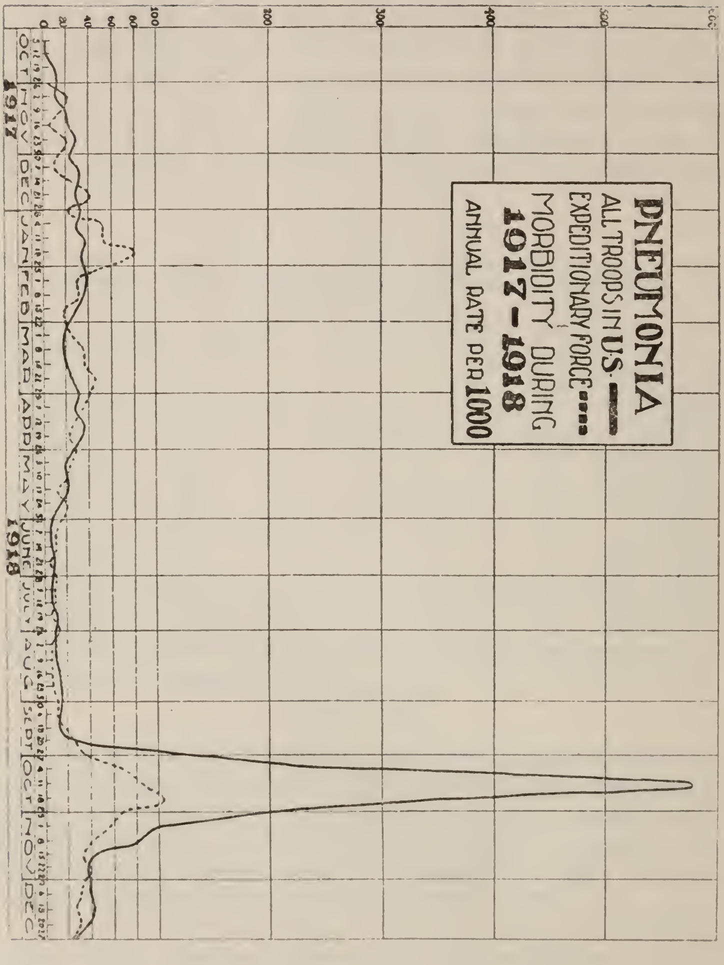
PNEUMONIA
ALL TROOPS IN U.S. ——
EXPEDITIONARY FORCE ----
MORBIDITY DURING
1917 - 1918
ANNUAL RATE PER 1000
0
20
40
60
80
100
200
300
400
500
600
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEPT
OCT
NOV
DEC
1917
1918

Fig. 51.

Less than 10 per cent. of venereal diseases is contracted by men after entering the army.

In the study of pneumonia the year was divided into three parts: The summer period ran from April 1 to August 31; winter, October 1 to March 31, and autumn, September 1 to December 31. Summer pneumonia was for the most part lobar in type and fatal beyond the average. Major Wooly is quoted as saying that exposure, fatigue and constitutional well-being are factors in pneumonia. In a certain experience barracks intended for 216 men were occupied by over 300 and in one case by 376. A shortage of bedding was a factor. "Each man was furnished with a cotton comforter which was adequate for Northern men but not sufficient to keep the Southern men warm on cool nights." Chronic infections were a factor. In 20 per cent. of the cases of pneumonia the men reported that they had had previous attacks of the disease.

A very illuminating discussion of the great epidemic of influenza is given. The most fatal epidemic in the more recent history of civilized peoples was the Great Plague in London in 1665 when 14 per cent. of the total population died; second comes the yellow fever epidemic in Philadelphia, in 1793, in which 10 per cent. died; and third, influenza-pneumonia in 1918 with a death rate of 3.1 per cent. The influenza-pneumonia rate (in all army camps) ranks fifth with a rate of 1.4 per cent. The pandemic of 1918 caused six times as many deaths as that of 1889-90. In the autumn of 1918, 338,343 cases of influenza-pneumonia were reported to the Surgeon-General or one man out of every four. One out of every twenty-four men had pneumonia —61,691 cases were reported. The number of deaths from influenza-pneumonia in camps was 22,186 or 1 out of 67. The short duration of the epidemic made matters worse. The pandemic of 1918 seems to have been more closely associated with the pneumonias than appears in any previous pandemic. The reports sent to the Surgeon-General indicate that uncomplicated influenza was not by any means a fatal disease and that the high death-rate was due to the pneumonias which followed.

The case mortality rate of pneumonia was in 1917:

11.2 per cent, 6 Winter months, 1917-1918.
23.1 per cent, 5 Summer months, 1918.
18.8 per cent, 4 Autumn months, 1918.

As to the cause of influenza-pneumonia the authors say:

"1. Influenza is an acute, highly infectious disease of unknown origin, characterized by the production of a marked leukopenia which results in withdrawal of the natural defenses of the body and the opening up of the paths of invasions for other pathogenic organisms which may be present.

"2. We are of the opinion one reason for the variation in the manifestations and course of the disease in different communities has been due to difference in the combinations of organisms which have worked symbiotically with the specific cause of influenza. This accounts for the finding of one organism prevalent in one place and another organism dominant in another.

"3. We are of the opinion that the epidemic of influenza which occured in the fall of 1918 was not a new entity but a recurrence or reappearance in a more virulent form of the disease which had prevailed in the various Army Camps during the previous year. Our justifica-

TABLE 10.—COMPARISON OF DEATH RATES OF ARMY AND CIVILIAN MALES, AGE 20 TO 29 YEARS ANNUAL RATE PER 100.000

Disease	Army	Civilian Males
Pneumonia	*431.	45.5
Meningitis	70.6	4.6
Scarlet fever	4.7	1.9
Diphtheria	2.2	2.0
Typhoid fever	2.8	47.2
Measles	5.6	.94
Tuberculosis	24.4	206.
All causes	*760.	642.

Note: Army Period is average of time from October, 1917, to December, 1918, inclusive. Civilian Period is year 1910.

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* The "Autumn Season" has been omitted in the Army Rates for Pneumonia and All Causes because of the influenza epidemic for which there is no counterpart in civilian life during 1910.

tion for this statement is that there are many incidents of people who largely escaped the disease in the fall and who had experienced or lived through a similar but much milder epidemic during the previous spring. In other words, we may say the soldiers who had clinical influenza in camp prior to August and those who, although having no clinical manifestations of the disease, lived through such an epidemic, were less gravely affected when the more virulent organisms reached them in the fall.

"4. We believe that the largest single factor influencing the spread of influenza is the susceptibility of the individuals among whom it has been introduced. If these individuals have been once attacked by the disease even in a mild form or lived through a mild epidemic without showing clinical symptoms, they suffer less when the disease is again introduced. Among communities not previously exposed to influenza, this disease has usually involved from 20 to 50 per cent. of the personnel. The exact number affected is determined by the number of people who are naturally immune or have secured immunity by previous exposure.

"5. It appears that natural immunity gives way before exposure, overwork and fatigue, as was demonstrated years ago by Pasteur in his experiments on birds with anthrax. Likewise, it is possible for human beings to have their resistance lowered by exposure to unaccustomed environment so that although naturally immune, the standard of immunity is reduced to the point where the influenza virus gains admittance, and overcomes the lowered resistance.

"6. We believe that not only the rapidity with which the disease spreads, but its virulence is in direct proportion to the density of the susceptible population. In communities such as army camps and large cities, the contact of individuals is so close and so intimate that even though extra precautions are taken it is quite impossible to prevent disease from ultimately reaching all persons. Precautions such as quarantine, spreading out of the personnel, closing places of assembly, delay the progress of the disease but fail wholly to prevent it."

Canadian Army. While suggesting that we must wait some time before full data as to disease prevalence among the fighting forces becomes available, G. G. Nasmith[2] feels free to make some observations. We can form some idea of what would have happened all over Europe had preventive medicine not succeeded to a degree unparalleled in history. So far, no great epidemics due to insects or to bad sanitation have followed the war except in Serbia and Russia. Smallpox, that curse of past centuries, was kept in absolute subjection by vaccination. Cerebrospinal meningitis never became epidemic. Men returing from leave were always introducing measles, mumps and other contagious disease but these seldom established themselves in epidemic form. The Highlanders and Maoris suffered most from these forms of contagion. Amebic dysentery caused no trouble except in the armies along the Mediterranean. It was found that Sahara heat and drying for several months would not kill the ameba. Nothing sufficed but burning the feces. No cases of cholera occurred on the Western front. True bacillary dysentery was rare. Typhoid was rare. Once, early in the war, when the British took over a sector of the Ypres salient they found the Belgian population devastated with typhoid and many cases among the French troops. The British did not contract it and in a short time they had eliminated the disease from among the civilian population. The use of unboiled milk, unheated water and uncooked vegetables was absolutely prohibited. No plague or typhus fever appeared. Malaria was comparatively unknown. Itch gave very little trouble. The first winter there was much trench foot but it was soon discovered that removal of puttees, drying the feet, and covering the feet and shoes with whale oil was a certain preventive and it became a crime for a man to get trench feet or for an officer to let his men have it.

Trench fever was responsible for the greatest number of casualties. Not taken seriously because it was not a killing disease it was the greatest disease factor in producing inefficiency in the army. When at its

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(2) Med. Record, April 19, 1919.

worst it had more men out of the fighting line at one time than were in the first British Expeditionary Force. Just as it was discovered to be a louse-borne disease and methods of control came to be worked out the war came to an end.

Many various sanitary appliances and methods employed are described in Nasmith's article which should be read in its entirety by sanitarians. He says: "The maintenance of the health of soldiers and the prevention of communicable disease is a comparatively simple matter provided you have proper medical organization and thorough discipline."

Disease in the Army. E. B. Vedder[3] says that in 1915 sputum-caused diseases in the United States Army of 63,725 mean strength caused 11,228 admissions, 192 discharges and 98 deaths and a non-effective rate of 370.02. In 1917 in a regular army with a mean strength of 199,263, these diseases caused 70,901 admissions, 668 deaths and 1,328 discharges. In the National Army with a mean strength of 165,916 they caused 52,319 admissions, 663 deaths and 507 discharges. In the National Guard with a mean strength of 193,489 they caused 1,983 admissions, 1,078 deaths and 1,983 discharges.

Influenza, bronchitis and tonsillitis are responsible for the highest rates. In 1917, measles caused more admissions than any other disease except gonorrhea, bronchitis and tonsillitis. Scarlet fever, diphtheria and meningitis are unimportant. Whooping cough was practically nonexistent. Vedder advises in favor of vaccination against pneumococci but not against streptococci and meningococci.

Mortality from Disease in Armies.[4] In the civil war the mortality from disease only was 65 per 1,000. In the present world war the mortality in the American Expeditionary Force from the same cause was 14.8 per 1,000 and of the number 12 were due to pneumonia.

Death-Rate in Army versus That in Civil Life. According to V. C. Heiser[5] it was more dangerous to

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(3) Military Surg., February, 1919.
(4) Edit. Military Surg., August, 1919.
(5) Jour. Amer. Med. Ass'n., Dec. 7, 1918.

be a soldier in peaceful United States in the autumn of 1918 than to have been on the firing line in France. The mortality of the soldiers in camps was higher than that of civilian groups of the same age periods. The death-rate among college students living in their customary surroundings was about that of the towns in which they lived but the death rate of the Students Army Training Corps was much higher approaching that of soldiers in camps in degree as the housing, eating and congregating conditions approached those of a military camp. Quartering men in barracks involved considerable risk of a high mortality rate from respiratory diseases.

INFECTIOUS DISEASES.

INFLUENZA.

Epidemiology of Influenza. That influenza has been fairly widely prevalent in this country since 1915 is the opinion of W. H. Frost.[6] In December, 1915, and January, 1916, there was a significant rise in mortality in New York, Cleveland and San Francisco. This rise was almost universal and synchronous over the entire registration area. In January, 1916, the *Public Health Reports* said that influenza was epidemic in twenty-three states. In January, 1918, there was a rise in mortality along the Atlantic Seaboard and a corresponding rise in the late Spring in the upper Mississippi Valley. Vaughan and Palmer[7] reported outbreaks at Oglethorpe and J. D. Robertson[8] one at Chicago. One in California in April was reported by L. L. Stanley[9] and one in Kansas by E. Lopie, A. W. Freeman, F. G. Blake, J. C. Small and T. M. Rivers.[1]

These outbreaks indicate more than a possibility that the October, 1918, wave was the nation-wide occurrence

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(6) Jour. Amer. Med. Ass'n., Aug. 2, 1919.
(7) Military Surg., October, 1918.
(8) Educational Series, Dept. of Health, Chicago.
(9) Pub. Health Reports, May, 1919.
(1) Jour. Amer. Med. Ass'n., Jan. 11, 1919.

of a disease more or less prevalent for several years. In the epidemic 450,000 or 4 per 1,000 of the population died. This is more than the total number of deaths probably due to influenza in the epidemics of 1889-93. Roughly speaking, the death rate from influenza, directly and indirectly, was in the cities east of the Appalachians, 5.6 per 1,000; between the Appalachians and the Rockies, 4.35; west of the Rockies, 5.65 per 1,000. Surveys showing the prevalence of the disease were made at New London, Conn.; Baltimore and other Maryland points; Spartanburg, S. C., Louisville, Ky., Little Rock, Ark., San Antonio, Texas, and San Francisco. The percentage of the population attacked varied from 15 at Louisville to 53.3 at San Antonio, the average for the group being 28 per cent. As several waves have swept across the country since the time of taking the surveys it is probable that considerably more than 30 per cent. of the population have had the disease since September, 1918. The case incidence was highest among children of from 5 to 14 years. It was higher among whites than among blacks. The death-rate was high in children under 1, in adults 20 to 24 years, and in persons over 60.

As to immunity Frost says the facts observed are inconclusive. A second survey made at Baltimore showed that only 121 out of 32,600 people claimed to have had a second attack. Closer investigation ruled out all of these except twenty-six. This is a small number and rather indicates that one attack confers immunity. The disease is the same as that of 1889-93. A study of the history of influenza indicates a probability of recurring waves but the disease will be mild in comparison with last year.

The Influenza Commission[2] reporting on the epidemic in the British armies states that the disease first appeared among the soldiers in April, 1918. Influenza bacilli were frequently found in the sputum of soldiers in 1916-17. There was an epidemic in the United States in 1917. Why it did not become a pandemic at these earlier dates it is impossible to say. The commission

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(2) Brit. Med. Jour., Nov. 9, 1918.

thinks that *B. influenzae* is responsible for the disease. The bacillus was occasionally agglutinated by the blood serum of convalescents. There was a small amount of complement fixation. Neither of these reactions was marked or definite.

C. D. Clark[3] says that influenza first appeared in the Canadian forces in Belgium, in May, 1918. The death-rate from influenza in the overseas force was 0.5 per 1,000; from bronchopneumonia, 0.56 per 1,000. Among the 60,000 troops in Canada there were 11,496 cases of influenza, 19.1 per cent., and total deaths, 716. Deaths per 1,000 troops (from influenza-pneumonia, 11.9). Vaccine was thought to have been of value. The insurance companies not only had to pay heavy death losses but the claims coming in for after-effects are high.

According to A. Netter,[4] the epidemic of 1918 is the same disease which spread over the world in 1889-90 and in previous epidemics.

He records his opinion that the cause is the Pfeiffer bacillus. At least he and many other bacteriologists have found this organism present. Some contended that the present epidemic was not the same as that of 1889, because it was so much in evidence in the summer season. Netter thinks probably this epidemic began in France in March. In London, the epidemic of 1743 had its maximum at the end of April, that of 1758 in September and October, that of 1762 at the beginning of April, 1782 in March, 1831 in June.

In 1889 many writers claimed the disease was nothing more than dengue then prevalent. In 1898 many writers likewise claimed that influenza was only a form of dengue. This form of dengue is the result of the bite of an insect called phlebotomes. But the epidemic started before this insect appeared in the spring, the bite of the insect could not be demonstrated and the incubation period of influenza is twenty-four hours or less, while that of dengue is from four to eight days.

It can be asserted positively that the disease is not

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(3) Trans. Med. Sect., Nat'l Fraternal Cong., August, 1919.
(4) Bull. de l'acad. de méd., Oct. 1, 1918.

dengue. The rapidity and method of spreading of this epidemic was exactly the same as that of 1889. Netter wrote in 1895 that the circumscribed local epidemics here and there were caused by the same agent as the great pandemic. Various epidemics of 1916 and 1917 were related to the epidemic of 1918. Such epidemics were reported by Hammond, Rolland and Shore in a British base camp in France and by Abrahams, Hallows, Eyre and French in a camp at Aldershot, also an epidemic in the German army was reported by Lewinthal.

W. T. Longcope[5] confirms the statements of the British and French authorities as to the beginnings of influenza in France. In the spring of 1918, the disease was well-advanced in Spain. It appeared in the American Expeditionary Force in April and May, 1918. It was a mild disease. The second appearance, a severe epidemic with lung complications, came in September and October. The third, a less severe wave, came in January and February, 1919. In the second wave secondary invasions of meningococci, pneumococci, streptococci and staphylococci seemed to play a considerable part.

In the discussion of Dr. Longcope's paper Dr. E. R. LeCount said that he made autopsies in April, 1918, on persons dead of a disease which he, Dr. Hektoen and Dr. Davis could not then identify but which he in October recognized as clearly influenza with lung complications and secondary infections.

B. Galli-Valerio[6] is in no doubt as to whether the 1918 epidemic of grippe is of the same character as that of 1889-90. The observers who called the disease patatose fever and dengue were confounded when the disease spread in the mountains and other sections where the insects which cause these fevers are not found.

Among those who have thought the disease due to a filterable virus are Nicolle Selter, Kruse, von Angerer and Prell. The demonstration of the effectiveness of this virus in producing the disease Galli-Valerio does not consider final. He thinks *B. influenzae* the cause of

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(5) Jour. Amer. Med. Ass'n., July, 1919.
(6) Rev. méd de la Suisse romande, Jan. 20, 1919.

influenza although many of the complications are due to other organisms. To grow the bacillus he makes use of the method of Levinthal: He makes 100 c.c. of ordinary agar, cools it to 70° and then adds drop by drop defribinated blood, mixing it carefully. He then sterilizes the mixture in a Koch sterilizer and places it in Erlenmeyer flasks or Petri dishes. He uses the blood of either man, rabbit, horse or ox. The sterilization is done three times. It is not necessary to decant or to filter. The mixture preserved against evaporation by silver paper caps will keep for several months. On the surface of slants or of a dish *B. influenzae* grows as short, nearly ovoid rods. Sobernheim and Nova Kovic say that influenza bacilli can be found in the sputum in little characteristic rods, absolutely Gram negative, extra-cellular or intra-cellular and can be made the basis of diagnosis.

Levinthal agglutinated *B. influenzae* with the serum of convalescents in strengths varying from 1 to 50 to 1 to 400. Galli-Valerio found *B. influenzae* alive after from 48 to 72 hours of drying. On the basis of this finding he advocates more thorough cleaning of sick rooms as a means of combatting influenza.

As to immunity to influenza: Some people have it naturally. One attack confers immunity certainly for three or four months and perhaps for longer. Many cases of supposed recurrence are in reality other infections. When recurrence does happen the second attack is mild. The degree of gravity of an epidemic is due to the crowding of many people into narrow, ill-ventilated quarters. The author has faith in vaccination and in the use of masks as preventive measures.

Methods of Controlling Influenza Epidemics. A report on methods of controlling influenza during the prevalence of the epidemic is presented by W. A. Evans, D. B. Armstrong, W. H. Davis, E. W. Kopf and W. C. Woodward.[8] They say that there is no known laboratory method for diagnosing the disease. The virus is given off from the nose and mouth of infected persons. The disease is not spread by animals. They advocate

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(8) Special Bull., Amer. Pub. Health Ass'n., Dec. 13, 1918.

compulsory reporting of cases and canvassing to discover the cases. As to closing, the report rather favored the procedure, but thought it would be of limited service in the cities. They did not favor the promiscuous wearing of masks on the streets, but thought they should be worn by attendants in hospitals. Patients should be isolated. Terminal disinfection was not advocated. Alcohol was said to serve no useful purpose. Sprays and gargles were pronounced useless. Vaccination against pneumonia was tentatively approved of. Additional information before reporting on the efficacy of other vaccination was asked for. It was suggested that every health department plan in advance against influenza; especially that plans for relief in case of emergency be worked out by a department of health in advance and held in readiness for widespread outbreaks.

W. H. Kellogg[9] is far from being optimistic as to efforts of health departments in controlling influenza. They are of service in organizing relief. The worst manifestation of the epidemic occurred in communities having no health organization. It was in such communities that the entire population was menaced with extinction. But amongst organized communities those with health departments fared no better than the others except that there was less suffering and neglect among the sick. Kellogg says that measures for control group themselves into:

1. Reporting cases.
2. Limitation of opportunities for contact, including: (*a*) Isolation of quarantine of cases. (*b*) Closing of public gatherings, places such as schools, churches, theatres, moving picture shows, public dances, etc. (*c*) Regulation of hours of opening and closing of factories and stores. (d) Wearing of gauze face masks.
3. Institution of hospitals, medical and nursing facilities.
4. Vaccines.
5. Education of the public in prophylaxis.
6. Prohibition of spitting and use of common drinking utensils.

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(9) Calif. State Jour. Med., July, 1919.

The reporting of cases is to be approved of even if it shows no results.

Kellogg analyzes the evidence as to a policy of closing and comes to the conclusion that it accomplishes nothing. He compared the curves in Boston, Washington, New York, and Chicago, and a dozen or more other American cities as a basis for his conclusions. He says that in every one of the eleven cities studied, the duration of time from the first sharp rise to the subsidence to approximately the base line is nine weeks. He concludes that closing measures are of no value in the larger cities, but that they should be put into practice in smaller towns and rural communities. He concludes that vaccines are of no value, accepting as the basis of that opinion McCoy's experience with a closed colony; at Napa State Hospital, using the Rosenow vaccine, and a similar observation on a closed colony in Massachusetts using the O'Leary vaccine.

He thinks the promiscuous wearing of face masks proved ineffective. "That the mask was not proving of value in controlling influenza was a conclusion reached after studying the mortality curve of San Francisco. Comparing Oakland and San Francisco, places situated alike, in one of which the general population wore masks and in the other they did not, he found no evidence of the efficacy of masks. Masks worn in an approved way in institutions he does think well of. Experiments done in the state hygienic laboratory showed that when masks were made of gauze 24x28 threads to the square inch, six layers were 38 per cent. efficient, eight layers, 56 per cent. efficient. With gauze of 60x72 threads to the square inch five layers gave an efficiency of 57 per cent., six layers of 47 per cent. and eight layers of 98 per cent.

In Christiania the board of health expressed an opinion that no public health measures can prevent the spread of influenza.[1] When this opinion appeared, a movement to impeach the commission was started. Holst is defending the opinion of the commission. A comparison of the influenza rates in Christiania, Copenhagen

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(1) Brit. Med. Jour., Dec. 21, 1918.

and Gothenburg, in some places a policy of closing schools and theatres having been followed, in others not, caused the commission to arrive at this opinion.

G. L. Cole[2] thinks that Los Angeles came out of the influenza epidemic very well, all things considered. He does not think the evidence shows that the wearing of face masks on the streets accomplished anything. The evidence as to the efficacy of vaccination seems to indicate some value, but the question remains *sub judice.* The theaters, picture shows and churches were closed, so were the schools. This resulted in delaying the peak of the epidemic.

Dr. Milbank Johnson[3] suggested before the recent meeting of the American Public Health Association that hand-shaking be stopped as a procedure for the control of influenza.

Some unsuspected routes of infection are discussed by G. A. Soper.[4] When a person is coughing, his distance from others increases their safety in greater proportion than a mere statement of the distance would indicate. To double the distance is to multiply the safety by 4; to treble it is to multiply it by 9. In earnest conversation men sometimes stand so close to one another that they can feel the impact of each other's breath. "To talk eye to eye and mouth to mouth is a careless habit which can be and should be stopped."

Used handkerchiefs are disease spreaders. In handling a handkerchief the hand should not touch the nose side.

Coughing and sneezing should always be done with a handkerchief held over the mouth and nose.

"If it were intended to devise an instrument whereby infectious matter could be collected, transferred and implanted where it would do the most harm it would be impossible to surpass the hand." He advises against the promiscuous shaking of hands.

C. Lynch and J. G. Cumming[5] contend that influenza may be spread especially in military camps by insufficiently washed and sterilized food kits.

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(2) Calif. State Jour. Med., June, 1919.
(3) Southwest Jour. Med. and Surg., April, 1919.
(4) Military Surg., May, 1919.
(5) Amer. Jour. Pub. Health, January, 1919.

P. F. Straub[6] says that to prevent influenza, indoor contacts must be lessened. Outdoor contacts are harmless.

It is reported by W. G. Armstrong[7] that an excellent maritime quarantine held influenza out of Australia for several months. The disease finally entered New South Wales Jan. 27, 1919. The history of the introduction of the disease in Newcastle is exceptionally clear cut. A sailor arriving in port sick was sent to a hospital with a diagnosis of typhoid fever on February 25. On March 2, the diagnosis was changed to pneumonic influenza. The sailor died that night. Within twenty-four hours, five nurses, two ward helpers, one staff member and six ward patients came down with the disease.

The measures for the control of the epidemic were disappointing. Notification and segregation accomplished little because of: (*a*) Spread by mild cases; (*b*) early infectivity; (*c*) short incubation period (about 48 hours).

On a mathematical basis, Armstrong estimates the rate of spread of influenza to be sixty-four times as rapid as that of smallpox. Prophylactic vaccination was done on more than one-half the population at Sydney. The results are now being investigated. The wearing of masks on the street has little to recommend it. Wearing of masks in infected homes by attendants was frequently ineffective. He thinks well of restriction of public assemblies largely on theoretic grounds. The use of sprays and spray rooms did not prove satisfactory.

Use of Vaccines. E. C. Rosenow and B. F. Sturdivant[8] report that in an observation extending over several months and applying to a great many people the average incidence of influenza and pneumonia among the unvaccinated is three times as high as among the vaccinated.

The average mortality rate in sixteen large cities, according to the U. S. Public Health Reports, was 5.4 per cent. The mortality rate among those inoculated

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(6) Military Surg., January, 1919.
(7) Med. Jour. Australia, April, 26, 1919.
(8) Jour. Amer. Med. Ass'n., August 9, 1919.

three times was about one-fifth that. A definite, though a smaller degree of protection, was afforded those who took only one or two inoculations. The tendency to the development of pneumonia in the vaccinated is about one-third as great among the vaccinated as among the unvaccinated.

The formula of the vaccine used was:

Pneumococci (Type I, 10 per cent.; II, 14 per cent.; III, 6 per cent.)	30 per cent.
Pneumococci, Group IV and the allied green-producing diplostreptococci	40 per cent.
Hemolytic streptococci	20 per cent.
Staphylococcus aureus	10 per cent.

The doses given were two and one-half billion, five billion and seven and one-half billion.

They prove apparently conclusively that the vaccine has well marked autigenic powers. When they used from twenty-five to seventy-five billions of the mixed bacteria in the form of a one-dose lipovaccine they produced a greater amount of agglutination. When streptococci were introduced intratracheally in guinea-pigs a disease clinically the same as influenza was produced. The authors report clinical results from many thousand cases from many sources supporting their contention.

In institutions with closed populations 9,388 persons who were not vaccinated cases had incidence per thousand rates as follows: Influenza, 200; edema of lungs, 0.5; pneumonia, 12; empyema, 0.6.

Deaths: Edema of lungs, 0.4; pneumonia, 5.5. In the same institutions among 8,306 persons vaccinated three times the incidence rates were: Influenza, 31; edema of lungs, 0.1; pneumonia, 1; empyema, 0.2. The death rates were edema of the lungs, 0; pneumonia, 0.5.

The results of the use of vaccination on pregnant women are difficult to interpret. Of 3,656 non-vaccinated women 294.6 developed cases of influenza. The incidence rates per 1,000 were edema of the lungs, 17.7; pneumonia, 80.4; empyema, 0.82; miscarriages, 46.2. Mortality of cases of influenza all causes, 20 per cent. Total deaths, per 1,000, 59.9. Of 997 who were vaccinated three times the incidence rate per 1,000 was: influenza, 109.3; edema of lungs, 17; pneumonia, 27; miscarriage, 14. The deaths of influenza patients, all causes, was 14 per cent. The authors contend that weight must be given to the opinions of the 430 physicians making these reports.

Tuberculosis and Influenza. The Lancet[9] quotes D. M. MacRae as saying that in Cape Town influenza bore lightly on persons who were tuberculous or had a history of catarrhal conditions of the lungs. W. H. Dickinson is also quoted as having observed at Newcastle that consumptives escaped influenza. In one London chest hospital the bed cases escaped influenza.

A. Meyer[1] gives an account of influenza at Bedford Hills (N. Y.) Sanitorium (for consumptives). By strenuous quarantine the disease was kept out of the institution until November 26. Then a case occurred in the person of a far-advanced consumptive. By December 9, forty-three cases had occurred; 20 per cent. of the population had the disease.

Incidence of Influenza. E. O. Jordan, D. B. Reed and E. B. Funk[2] found the incidence of influenza in nearly 20,000 people to range from 3.9 per cent. to 39.8 per cent. in the different groups. The 3.9 per cent. group was a body of student training corps men who were rather exceptionally well supervised medically. The other groups had such rates as 13.7, 19.2, 17.5, 21.3, 24.8 and 39.8.

The case fatality rate in the three larger groups was 1, 1.5 and 2 per cent. The clinically diagnosed pneumonia rates per 100 cases of influenza in the larger groups were 6.6, 7.8 and 13. The schools were not important distributing centers of infection.

The U. S. S. Salem, says F. M. Harrison,[3] was visited by an epidemic of influenza December, 1915, which lasted until March, 1916. Influenza has always been more or less prevalent aboard the U. S. S. Salem, but with the exception of February, September and October,

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(9) Feb. 22, 1919.
(1) Med. Record, April 12, 1919.
(2) Pub. Health Reports, July 11, 1919.
(3) Med. Record, April 26, 1919.

1918, the disease has never been epidemic. In December, 1917, there were fifteen cases. "I am firmly convinced that the ordinary sporadic cases of *la grippe* such as one sees in his daily practice are not different fundamentally from the influenza which we call epidemic."

At Camp Beauregard D. J. Frick[4] reports that 15,000 troops were stationed of whom 7,500 had influenza and 427 died. In the personnel of the base hospital there were 610 persons of whom 327 had the disease and four died. Of the 300 nurses 152 had the disease and two died. Of the 3,200 soldiers in the Fifth Infantry 2,600 had the disease and 125 died. Of the 7,500 cases of influenza 1,474 or 19.6 per cent. developed pneumonia. All of the 427 deaths were from pneumonia—a mortality of 29 per cent.

M. Scham,[5] reporting on the epidemic of influenza at Camp Dodge, says that the disease is carried by human carriers along paths of human travel. An analysis of 834 patients showed that it affected from 20 to 30.4 per cent. of the men, 20 per cent. of Jews, 29.3 per cent. of negroes, 30.4 per cent. of whites not Jews; 61 per cent. were 20 to 25 years of age. Scham is disposed to think that an attack of influenza confers at least a temporary immunity.

E. F. Hirsch and M. McKinney[6] reported in November, 1918, that the epidemic of influenza at Camp Grant was due to a virulent strain of the pneumococcus. The extreme virulence of this organism they held to be responsible for the violent epidemic conditions.

Bacteriology of Influenza. The bacteriology of influenza remains a field of controversy. E. O. Jordan[7] made a series of bacteriologic studies of the secretions of the upper respiratory tract in cases of influenza, bronchitis, pneumonia and common colds, during the height of the epidemic and for several months thereafter, which indicate either that the bacteria of influenza are not located in the upper respiratory tract or else the culture methods employed are not suited to the causative agents

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(4) Amer. Jour. Med. Sci., July, 1919.
(5) Minnesota Med., August, 1919.
(6) Jour. Amer. Med. Ass'n., Nov. 21, 1918.
(7) Pub. Health Reports, June 27, 1919.

of this disease. There was no radical difference between the bacteriology of influenza and that of common colds and ordinary bronchitis and pneumonia. The bacteriology of different cases of influenza varied. There was variation in the bacteriology of a given case at different stages of the disease and no type of bacteria dominated the field.

The organisms most frequently found were the Pfeiffer bacillus and the Mathers streptococci. The Pfeiffer bacillus was found in 64 per cent. of the influenza cases being more prevalent toward the end of the epidemic. It was found most frequently in the uncomplicated cases. In some cases it was the predominating organism. Rarely were the Pfeiffer bacillus and hemolytic streptococci present in numbers in the same case. The cases in which the Pfeiffer bacillus predominated the bacteriologic field did not differ clinically from those in which it did not.

Perhaps the second most frequently found organism was the Mathers streptococcus. Jordan thinks that this organism is probably *Streptococcus buccalis*. This coccus was present in predominating numbers in a few cases, but these did not differ clinically from the other cases.

In colds and tonsillar infections these two organisms were not found with frequency. The organism seeming to predominate there was the green streptococcus. In colds, the Pfeiffer bacillus was found in only about 14 per cent. of the cases and the Mather bacillus in about an equal number. The pneumococcus was found in 20 per cent. of the influenza cases and 25 per cent. of the tonsillitis and rhinitis cases.

Micrococcus catarrhalis, Friedlander bacillus and a Gram-negative diplococcus were found at times in large numbers in the nose and throat and nasopharynx in influenza cases. Staphylococci were also abundant sometimes.

A method of distinguishing between influenza and common colds found to be of some value was by leukocyte count. In common colds there is a leukocytosis. In twenty-two cases of common colds there was an average count of 12,600 on the first three days of the disease. The average count of eight cases during the fourth and fifth days was 11,600, of seven cases during the sixth and seventh days was 8,800.

In thirteen cases of simple influenza there was an average count of 6,100 during the first, second and third days. In nine cases of 4,900 during the fourth and fifth days, in six cases of 6,100 during the sixth and seventh days.

Where pneumonia developed during the course of the influenza the leukocytosis was less and developed later than in uncomplicated pneumonia.

Vaccination Useless. G. W. McCoy[8] has no faith in vaccination against influenza. He even suggests that the pathology of influenzal pneumonia may be due to the primary infecting organism and that the various organisms such as pneumococci and streptococci reported from many places may not reach even the dignity of secondary invaders and may be looked upon as relatively saprophytic. He says that immunity requires from seven to ten days to develop and reports applying to other than closed communities with adequate controls are valueless. For these two reasons he rejects practically all of the reports on vaccination. He quotes Hinton and Kane as having had more cases and more deaths among the people of an institution vaccinated with O'Leary vaccine than among the non-vaccinated. He also quotes a report from the U. S. Training Station at Pelham Bay to substantially the same effect. In a group of institutions supervised by the Public Health Service, 484 persons were vaccinated with 153 cases, 31.6 per cent., and no deaths; as compared with 842 not vaccinated, 26.4 per cent., and four deaths or 1.8 per cent.

He also quotes C. F. Ely, B. J. Lloyd, C. D. Hitchcock and D. H. Nickson,[9] who made use of a streptococcus vaccine and claimed to produce immunity. McCoy does not think their conclusions were justified. He also quotes Eyre and Lowe, who thought vaccination with mixed bacteria containing streptococci might lower resistance and a later communication from the same authors that

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(8) Jour. Amer. Med. Ass'n., Aug. 9, 1919.
(9) Ibid., Jan. 4, 1919.

might be interpreted as favoring vaccination. All in all, these communications leave McCoy non-plused.

Trial of the Rosenow vaccine made in California in a closed community, well-checked, indicated that the remedy was valueless. The other reports on the Rosenow vaccine McCoy rejects as impossible of valuation. He concludes that the general opinion is that vaccination is of value, but that when the observations have been properly checked the vaccination has been shown to be without effect in favorably influencing either morbidity or mortality.

Failure to Infect. When the flood of experiences during the 1918 influenza epidemic began to wipe out belief in the orthodox methods of controlling droplet-borne infections, it was supposed that something would be left. First there came reports that efforts to prevent crowding, the closing of schools and other assembling places, the hospitalizing of patients, the wearing of masks—all of these were ineffective. Then came the flood of reports that the influenza bacillus was not responsible for the disease. And, finally, M. J. Rosenau[1] threatens to overthrow the opinion that the disease is contagious. A group of young men were inoculated in the nose with pure cultures of influenza bacilli. None gave evidence of infection. A group of young men, none of whom had had influenza were inoculated in the nose by cultures of various strains of influenza bacilli obtained from persons dead of the disease. Some were inoculated in the eye and some in the throat. None became infected. Next, material from the noses and throats of persons acutely ill with influenza was used to inoculate the nose and throats of supposedly susceptible young men. None came down with the disease. Thinking that perhaps the organism might have died during the interval elapsing between obtaining the material and using it, another set of men were inoculated with material less than two hours old with negative results. Still another lot were inoculated with material unmixed with salt solution or anything else. Results were negative. Material from cases of influenza was filtered

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(1) Jour. Amer. Med. Ass'n., Aug. 2, 1919.

and young men were inoculated with it. Again results were negative. Blood from influenza patients was citrated and injected into supposedly susceptible young men. Results were again negative. A group of ten young susceptibles was taken into the influenza ward. Each took his seat by a patient, held his face two inches from that of the patient and allowed the man sick with influenza to breathe and cough "into his face." None contracted influenza.

And now for the only positive results secured by Rosenau. Some months after the onset of the Boston epidemic a new outbreak occurred at Portsmouth, a group of supposedly susceptible men were carried there, and were inoculated with material from cases of clinical influenza. In about thirty-six hours, half of the exposed came down with fever and sore throat which cultures showed to be due to hemolytic streptococci. One of the physicians, a man who inoculated six men without an infection, developed influenza. Rosenau says: "Perhaps if we have learned anything from this epidemic it is that we are not sure what we know about the disease."

In reading this report, one can not help but wonder why these young sailors failed to develop influenza at the rate prevalent at that time among sailors on that station. According to the law of averages about half of them were due to have the disease. Why did all of them escape?

Continuing the work upon which Capt. George Mathers was engaged when he died from influenza, R. Tunnicliff[2] reports that her chief found a green producing streptococcus present in 87 per cent. of the cases of influenza examined at Camp Meade. Tunnicliff reports that specific antigens for this coccus developed during the course of the disease. She also found that the leukopenia of influenza is accompanied by a nonspecific disease in the phagocytic activity of the leukocytes. She suggests that this leukopenia and diminution of the phagocytic activity of the leukocytes in influenza may account in some degree for the severity and frequency of secondary infections in this disease.

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(2) Jour. Amer. Med. Ass'n., Nov. 23, 1918.

G. H. Dick and E. Murray[3] found *M. catarrhalis,* staphylococci, hemolytic streptococci and various types of pneumococci and *B. influenzae* in cases of influenza. None of the cases with a pure culture of *B. influenzae* was fatal. Leukopenia was present.

K. Howell and R. Anderson[4] found that influenza blood serum gave a large number of positive complement-fixation tests with the viridans group of streptococci isolated from cases of influenza. The evidence indicates that such organisms played an important part in the morbid processes.

Having made many studies by direct smears, cultures and specific reactions W. H. Park[5] is of the opinion that the influenza bacillus is only a secondary invader. He thinks the same conclusion is justified as to certain streptococci and pneumococci. He says: "Our final conclusion is that the microörganism causing this epidemic has not yet been identified."

That the organism of influenza is a filterable virus present in the secretions of the nasopharynx and bronchial tubes but not in the blood, is the opinion of C. Nicolle and C. Lebailly.[6] They were able to reproduce the disease by injection subcutaneously and by inoculation of the nasal mucus membrane and conjunctiva, but not by intravenous injection. They used two species of monkeys and several men, succeeding in every instance. The uniformly negative results when blood was used suggested that the organism is not found in the blood-stream.

Method of Making Lipovaccine. E. C. Rosenow and A. E. Osterberg[8] describe a simple and speedy method of making lipovaccine and one giving a less toxic product than usual.

The bacteria are grown as usual. The growth smears are removed and mixed in a wide mouth bottle with sterile saline solution. The bacteria are then killed by

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(3) Jour. Infect. Dis., July, 1919.
(4) Ibid.
(5) Jour. Amer. Med. Ass'n., Aug. 2, 1919.
(6) Presse méd., Oct. 17, 1918.
(8) Jour. Amer. Med. Ass'n., July 12, 1919.

thermal or chemical means or both: if by heat a temperature of 60° C. is maintained for thirty minutes; if by chemical means enough cresol is added to make a 2 per cent. solution. In the case of *Staphylococcus aureus,* both heat and cresol are used. When the saline suspension has been found to be sterile it is transferred to a large pyrex flask. For each liter of broth culture, 5 c.c. of sterile cotton seed oil containing 5 to 10 per cent. lanolin are added. About 100 grains of solid glass beads are then added and the flask is placed in the oven and shaking machine, though occasionally shaking by hand suffices. The oven is kept at from 60° to 65° C. The flask is connected by flexible pressure tubing with two condensing bottles and these with a feeble vacuum pump. The first bottle is to receive the fluids and the second bottle contains a little unslaked lime or calcium chloride.

The water is removed from the mixture and a suspension of bacteria in oil is left behind. The completion of evaporation of the water is shown by clearing of the mixture and by the absence of water of condensation in the bottles and tubes. A plug of absorbent cotton between bottles 1 and 2 prevents infection from the inrushing air when the vacuum pump is disconnected. The suspension is poured into stock bottles through a fine wire mesh screen.

The dose of vaccine used is 0.5 c.c. representing about 25 billion bacteria. The cotton seed oil and lanolin are sterilized by steam at 15 pounds pressure for twenty minutes and then for a like time in a hot air oven at 105° C. The oil suspension requires no chemical disinfection. Incidental to the discussion Rosenow and Osterberg say that they have had good results from treatment with autogenous lipovaccines in severe furunculosis, infections of the maxillary sinus and other conditions where prolonged immunization is required.

Few After-Effects. F. E. Fronczak and F. C. Gram[9] had the Buffalo health department make a survey to determine the after-effects of the influenza epidemic of 1918. They found that 33,880 cases of the disease had

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(9) Buffalo Sanitary Bull., April 30, and June 30, 1919.

been reported; 3,179 persons had died and 28,663 reported that they had fully recovered; 1,290 could not be located. At the time of the March visit 748 persons claimed that they had not fully recovered from the effects of influenza.

Seven hundred and forty-eight is a small percentage of 33,880 and the report indicates that the after-effects of influenza are not considerable. Two months later, a second call was made on the 748. At the time of the second visit it was found that four had died, 501 had fully recovered, 216 reported that they were improving and twenty-seven claimed that they were no better.

A close study developed twenty-eight cases of consumption or probable consumption. Of these, eleven were found to be on the list of persons known to have consumption prior to October, 1918. In only eight cases did it appear certain that the disease had developed after the epidemic. Eight cases from a list of 33,880 is a very small number.

Of the 206 cases of rheumatism, 128 persons had recovered and seventy-eight were improving. Of the twenty-three persons claiming to have disease of the urinary organs due to influenza eighteen had recovered and five were improving. Of the forty-six cases of nervous diseases, thirty individuals had recovered and sixteen were improving.

The survey indicated that there is remarkably little after-effect from influenza considering the gravity of the constitutional involvement.

The report says: "One fact is definitely established and that is that we have nothing to fear from tuberculosis as a sequel to influenza."

Miss Zora Huddleston[1] takes a position just the opposite to that of the Buffalo Health Department. She visited ninety persons carried on the nurses' rolls as having had influenza; forty-five had fully recovered, but thirty-five had enough chest symptoms to warrant the nurse in advising physical examination of the chest.

Natural and Acquired Immunity. Were the husky and strong more susceptible to pneumonia and influenza

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(1) The Campaign, Des Moines, Iowa, July 15, 1919.

during the recent epidemic than were other members of society? It certainly bore heaviest on men and women in the prime of life and strength. Vigor and right living seemed to predispose rather than to protect. Pregnant women were the worst sufferers, but the predisposition seemed to be a product of the pregnancy and not of any diseases such as grave vomiting, eclampsia and albuminuria incidental to the condition. There were many observations which seemed to indicate that the tuberculous were not average susceptible to the disease. D. B. Armstrong[2] found considerable proof of this in his analysis of the first wave of the epidemic in Framingham. In that wave, 16 per cent. of the general population were affected, while only 4 per cent. of the tuberculous were attacked. In the group of arrested tuberculosis, only 2 per cent. had influenza. In Washington it was found that the disease was much less prevalent among negroes and this may have been due to the higher infection rate from tuberculosis among negroes.

In Framingham, 2.16 per cent. of the entire population have tuberculosis, active and arrested, as compared with a rate of 4.85 per cent. among the Irish and 0.48 per cent. among the Italians. Dublin's observations in New York State show about the same proportions. On the other hand, in Framingham during the wave the Italians had four times as much influenza as the Irish. Armstrong holds that there is considerable ground for the opinion that the repeated acute respiratory infections occurring during tuberculosis produce a certain degree of immunity to influenza or to the secondary infections which produce most of the symptoms.

EPIDEMIC ENCEPHALITIS.

Epidemic Encephalitis and Influenza. H. Heiman[3] contends that the sleeping sickness, or encephalitis, of which something was heard in the winter of 1918-19, was nothing more than a post-influenzal encephalitis. As

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(2) Boston Med. and Surg. Jour., Jan. 16, 1919.
(3) Amer. Jour. Dis. Child., August, 1919.

far back as 1712, Zuelzer described the condition and ascribed it to influenza. Since that time, this disease has come in the wake of every great pandemic of influenza, and has not come at any other time.

The Medical Officer[4] abstracts the recent monograph report of the Local Government Board on "Encephalitis Lethargica." Proof conclusive was found that the disease is neither a manifestation of botulinism nor of acute poliomyelitis.

P. Bassoe[5] follows P. Saniton[6] in defining epidemic encephalitis as "a toxic infectious epidemic syndrome characterized clinically by the tread, lethargy, ocular palsies and a febrile state and anatomically by a more or less diffuse encephilitis most marked in the gray matter of the mid-brain."

He cites authorities as having described six ill-defined epidemics of this disease as follows: Tubingen, 1718; one described by Lepecq de la Clotture, 1768; Germany, 1745; Lyons, 1800; Milan, 1802; Hungary, Northern Italy, France and Germany in 1889 or 1890. He calls attention to the significant fact that the disease has never appeared except in the wake of influenza.

A case of lethargic encephalitis is reported by C. M. Stafford,[7] who mentions the fact that every epidemic of this disease has come in connection with influenza. In the April number of the *Journal of Laboratory and Clinical Medicine,* Vaughan gave a synopsis of the literature of the disease. Von Weisen found a diplostreptococcus which he thought to be the cause of the disease; v. Economo found that the virus was not filterable. Stafford succeeded in growing a large diplococcus in the spinal fluid of his case. It grew as a Gram-positive diplococcus in short chains. It stains poorly with ordinary laboratory dyes. Growing on blood agar plates it does not hemolyze or produce greenish areas. Injected into a guinea-pig it produced no effect. It grew in levulose, saccharose and glucose broth without producing gas.

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(4) Jan. 25, 1919.
(5) Jour. Amer. Med. Ass'n., April 5, 1919.
(6) Presse méd., Sept. 23, 1918.
(7) Jour. Lab. and Clin. Med., August, 1919.

PNEUMONIA.

Etiology. In June, 1918, Rufus Cole[8] predicted a repetition of the pneumonia experiences of the winter of 1917, during the winter of 1918. He asserts that lobar pneumonia is due to the pneumococcus, and that bronchopneumonia is due to streptococci. He advocates immunization against pneumococci, but says that immunization against streptococci will prove difficult.

"I should like to emphasize the fact that acute lobar pneumonia is an endemic disease while streptococcus bronchopneumonia occurs chiefly in epidemic form. Given a suitable soil, streptococci rapidly gain in virulence. Every new case of infection adds not only to the extent but also to the intensity of the epidemic.

Pneumonia in Army Camp. E. H. Schorer, F. D. Clark, R. Sanderson, J. D. Dickson and F. M. Huntoon[9] had charge of some pneumonia and empyema investigations at Camp Merritt in 1917-18. Pneumonia of all types was encountered indiscriminately. There was no established relationship between the type of infecting organisms and the type of pneumonia. Empyema was the most frequent complication. In 181 pneumonia patients, eighty-one had fluid in the chest, fifty-six had pus. Hemolytic streptococci were found in 51.9 per cent. of the pneumococcus sputa; 53.7 per cent. of the pleural exudates and 70.4 per cent. of the purulent exudates. Of the straight pneumococcus pneumonias, 34 per cent. were complicated with chest fluid and 25 per cent. with empyema. Other rates were: pneumococcus, and hemolytic streptococcus, 26.3 and 24.9 per cent. respectively; pneumococcus and non-hemolytic streptococci, 15 and 7.5 per cent.; all pneumonias with pneumococci, 26 and 20 per cent.; all pneumonias having hemolytic streptococci, 37.2 and 25.4 per cent.; in 116 cases with type pneumococci, twenty-two of the twenty-six empyemas were caused by hemolytic streptococci. The streptococci were secondary invaders. It is entirely possible to produce sera against hemolytic streptococci

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(8) Jour. Amer. Med. Ass'n., Aug. 24, 1918.
(9) Med. Record, April 26, 1919.

giving as high precipitin titer as is usual with animals immunized against the pneumococci. Measles was not a factor in this epidemic.

Results of Vaccine Therapy. The results of vaccinating 13,460 men with pneumococcus lipovaccine containing 10 billion each of Types I, II and III are reported by R. L. Cecil and H. F. Vaughan.[1] The vaccination began just at the onset of the influenza epidemic in Camp Wheeler. During the previous winter, Camp Wheeler had had 917 cases of pneumonia, the second highest rate among the camps. In August, 1918, a second outbreak of pneumonia occurred. From July 1 to October 1, 1918, there were 216 cases of pneumonia with thirty-four deaths. The first vaccination was done Sept. 21, 1919; about 80 per cent. of the men were vaccinated. The reactions were always mild. There were thirty-two cases of pneumonia among the four-fifths of the force vaccinated and forty-two cases among the unvaccinated one-fifth. However, if all cases that developed pneumonia with one week of vaccination be eliminated, there remain but eight cases of pneumonia occurring in four-fifths of the troops. Antibodies do not appear in the blood serum until eight days after the injection of pneumococcus lipovaccine. There is no evidence that pneumococcus vaccination predisposes toward either pneumococcus or streptococcus pneumonia. The pneumonia rate was twice as high for recruits and seven times as high for seasoned men among the unvaccinated as among the vaccinated. Influenza causes a marked reduction in resistance to pneumonia even among vaccinated men. Of 155 cases of pneumonia developing one week or more after vaccination, 133 were secondary to influenza. The death-rate from pneumonia among the vaccinated was only 12.2 per cent., whereas that among the vaccinated was 22.3 per cent. The death-rate for primary pneumonia among the vaccinated was 11.9 per cent.; among the unvaccinated, 31.8 per cent. A combination influenza and pneumococcus vaccine was used in vaccinating 2,226 men. The simultaneous injection in no way in-

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(1) Jour. Exp. Med., May, 1919.

terfered with the effectiveness of the pneumococcus vaccination. In conclusion Cecil and Vaughan say: Pneumonia now kills more people than any other infectious disease and the rate is increasing. A majority of the pneumonias seen in civilian adults is of the primary lobar type, the kind most amenable to prophylactic vaccination. If methods can be devised for still further reducing the toxicity of pneumonococcus vaccine, and if educational propaganda are instituted in its behalf there is no reason why vaccination against pneumonia should not find a large field of usefulness in civilian as well as army life.

Infantile Paralysis.

Epidemic Prognosis of Infantile Paralysis. C. W. East[2] thinks the epidemic prognosis of infantile paralysis is grave for several years to come. In Illinois there were 1,000 cases in 1916, a like number in 1917 and about 800 in 1918. [The Chicago Health Commissioner is apprehensive about 1919.—Ed.] Minnesota, Wisconsin and Iowa have suffered local epidemics repeatedly. Epidemics of infantile paralysis come in about ten-year cycles, especially in the vicinity of the great cities the disease remaining mildly endemic in the intervals.

The convalescent stage of the first two years after the acute attack offers the opportunity for successful work. During the first two years, rest, prevention of deformity and retraining of muscles must be made use of. For this purpose, a state board of health should maintain a traveling clinic with physicians and nurses. The clinic should visit each clinic center once every two weeks.

In Illinois there are sixteen clinical centers and four other centers have been visited from two to six times. Each case is seen once every two weeks for six months and then at longer intervals.

Patients seen at clinics	900
Revisits to patients in homes	2,000
Number of braces, casts, shoes and appliances	600
Number receiving muscle training	400
Number sent to hospitals	37

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(2) Modern Medicine, August, 1919.

The Dubuque Epidemic. The Dubuque, Iowa, epidemic of anterior poliomyelitis is reported by E. C. Rosenow.[3] The epidemic had been in existence two weeks when Rosenow arrived. All diagnoses were made by spinal puncture. Treatment was with a serum prepared from cases of infantile paralysis. Before Rosenow began, paralysis was marked in the cases and the mortality rate was high. The serum was given to all patients regardless of the apparent prognosis. The mortality rate dropped from 47 to 4 per cent. Fifty-four patients were treated; twenty of these had no paralysis; 15 were paralyzed when injected. In no one did the paralysis extend after the injection; nineteen had advanced paralysis at the time of injection; of these two died.

A study of the histories of other members of the family convinced Rosenow that a large proportion of the population harbored this infection, but that only 0.1 per cent. had developed symptoms. He says: "In this connection it is of interest to note that the incidence of poliomyelitis in families and in the community at large during epidemics in summer is about that of rheumatic fever or pneumonia during the colder seasons. More virulent infections are prone to occur in the epidemic form."

Infectivity. S. Flexner and H. L. Amoss[4] hold that the virus of infantile paralysis is regularly present in the nasopharynx in the first days of illness, but that it diminishes relatively quickly as the disease progresses. The period of greatest infectivity is early in an attack. Carriers occur but the indications are that enduring carriers of the active virus are of exceptional occurrence.

[The tendency of the infantile paralysis incidence rate to drop to a low level between epidemics is no greater than that of many diseases and is less than that of many diseases.—Ed.]

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(3) Minnesota Med., July, 1919.
(4) Jour. Exp. Med., April, 1919.

CEREBROSPINAL MENINGITIS.

Etiology. The main etiologic factors in cerebrospinal meningitis are fixed by J. A. Glover[5] at six, to-wit:

1. Season—the first quarter of the year.
2. Severe weather of all kinds and particularly sudden variations; east winds and intense cold.
3. Antecedent epidemics of influenza.
4. Causes temporarily lowering resistance such as antityphoid inoculation, fatigue, strenuous training, nostalgia, railway journeys and the strangeness of barrack life.
5. Overcrowding.
6. A high carrier rate of epidemic strains of the meningococcus in the population at large.

Crowding and Carriers. J. A. Glover,[6] studying the relation of overcrowding to meningitis came to the following conclusions:

1. A high meningococcus carrier rate denotes that dangerous overcrowding exists.
2. Serious overcrowding (beds less than 1 foot apart) is usually accompanied by a carrier rate of at least 20 per cent. [A 20 per cent. carrier rate is the danger line according to memoranda of the War Department dated March, 1917.—ED.]
3. A carrier rate of 20 per cent. means that the rule of 40 square feet to the bed and beds 1 foot apart has been infringed.
4. Whenever the carrier rate reaches 20 per cent. even without the occurrence of a single case of the disease, effective action to abolish overcrowding, to increase space between beds to 2½ feet and to ventilate must be made at once.
5. The distance between beds is of paramount importance.
6. Carrier rates of from 10 to 20 per cent. imply overcrowding.
7. Whenever a high carrier rate has been established

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(5) Brit. Med. Jour., Nov. 9, 1918.
(6) Jour. Hygiene, October, 1918.

the spacing must go to 3 feet between beds, 60 square feet to the bed and 600 cubic feet of air and ventilation.

J. T. Short[7] studying cerebrospinal meningitis at Great Lakes Naval Training Station, Illinois, is not disposed to place great dependence on the percentage of carriers as an index. He thinks it no more important than crowding, over-training, immaturity, fatigue and exposure to weather.

MEASLES.

Acquired Immunity in Measles. D. L. Richardson and Hilary Connor[8] were able to produce immunity to measles by the injection of blood serum from patients convalescent from the disease. This passive immunity in all probability is short-lived though it will persist long enough to protect against infections by the ordinary contact during the prevalence of an epidemic. They also succeeded in inducing an active immunity by the simultaneous injection of blood serum and inoculation of the nasal mucous membrane with excretions from the membranes of persons ill with the disease.

The method of securing what was probably passive temporary immunity was as follows: Blood was drawn from the flexor surface of the elbows of about five persons, from seven to twenty days after the measles rash. This serum was drawn into sterile tubes and set in the refrigerator over night. Then the serum was decanted into sterile tubes and held in the refrigerator for a week if necessary. If it was to be kept longer than a week a 0.25 solution of tricresol was employed. The serum was tested for Wassermann reaction and that drawn from several patients was mixed. The injection of serum was given intravenously into the thigh. The dosage employed was from 7 to 25 c.c. A single dose was given. No reaction followed. The treatment was given as soon as possible after exposure.

The method of actively immunizing was based upon

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(7) Jour. Infect. Dis., August, 1919.
(8) Jour. Amer. Med. Ass'n., April 12, 1919.

the method employed in hog cholera vaccination. There was intramuscular injection of convalescent serum and simultaneously some fresh secretion from the nose of a case of active measles was rubbed on the nose of the child in whom immunity was to be induced.

Fourteen children who had not had measles and who were of the most susceptible age were protected by the first method; six were very definitely exposed and eight were partially exposed. None developed the disease. The controls developed the disease.

The apparent immunity was observed as lasting something more than five weeks. Three children were immunized by the active method. The nasal secretion employed was taken from a patient less than 5 minutes before it was employed.

One patient had an eruption that may have been a modified measles eruption twelve days after the inoculation. It was unaccompanied by the constitutional reaction of measles. Neither of the other two had any eruption. None of the three had measles although all were young and susceptible and none had had measles.

Bacteriology of Measles. A. W. Sellards and John A. Wentworth[1] failed to substantiate the claims of Anderson, Goldberger, Hektoen and others that when the blood from measles patients is injected into monkeys and men measles is produced. They injected monkeys with negative results. They injected blood from a monkey which had been injected without producing any disease. They did not find a leukopenia in an injected monkey to be a measles reaction.

DIPHTHERIA.

Cause of Death in Diphtheria. B. W. Carey,[2] analyzing 1,000 deaths from diphtheria occurring in Boston found no evidence that schools were considerable factors in the spread of the disease. Of the deaths, 69.4 per cent. were in children under 7 years of age; 2.4 per

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(1) Bull. Johns Hopkins Hosp., March, 1919.
(2) Boston Med. and Surg. Jour., Jan. 16, 1919.

cent. were in persons over 15; in 12.1 per cent. the age was not given. Since some of the children between 7 and 15 were not in school, while perhaps an equal number of those whose ages were not given were in school, it is probable that the proportions were not far from correct. In other words, about 86 per cent. of the diphtheria occurs among persons not of school age. Since children of school age are in school only one-third of the day for five days a week for ten months it is probable that infection in the school is responsible for not more than one-half of the remaining 14 per cent., or 7 per cent. of all the diphtheria. The first year of life is that in which occurred the largest proportion of these fatal cases—20 per cent. In the second year the percentage was 13.4; in the third year, 11.9; the fourth year, 9.8 and the fifth, 6.9. In only 10.7 per cent. of the cases was the source of infection ascertained. In 98.3 per cent. there was not even reasonable conjecture as to the source.

The seasonal prevalence was as follows: January, 9.5; February, 9.6; March, 7; April, 8.5; May, 3.8; June, 3.8; July, 2.8; August, 6.3; September, 7.2; October, 10.9; November, 12.6; December, 12.3.

The number of days of illness before the physician was called was:

1 day	17	6 days	28
2 days	34	7 days	39
3 days	41	8 days	6
4 days	37	9 days	2
5 days	35	10 days	14
11 days or over	20		

Of the patients, 23.1 per cent. were sick a week, 4.2 per cent. one to two weeks before having any medical attendance. In 7.6 per cent. of the cases, a diagnosis was not made before death. In twenty-nine cases less than 3,000 units of antitoxin were given. In one case 225,000 units were administered. The usual dose was 6,000 to 9,000 units. In no case was antitoxin given intravenously.

Diphtheria Death-Rate. The U. S. Public Health

Service[3] states that diphtheria still causes a death-rate of approximately 20 per 100,000 in New York City, Rhode Island, Pennsylvania, Kentucky, North Carolina, Massachusetts and Michigan.

The susceptibility rate to diphtheria at different age periods according to Park is:

Under 3 months	15 per cent.
3 to 6 months	30 per cent.
6 to 12 months	60 per cent.
1 to 2 years	70 per cent.
2 to 3 years	60 per cent.
3 to 5 years	40 per cent.
5 to 10 years	30 per cent.
10 to 20 years	20 per cent.
Over 20 years	15 per cent.

To determine susceptibility, the Schick test is used. The material for this test is supplied ready for use by different manufacturers. The test consists in injecting from 0.1 to 0.2 c.c. into the skin of the flexor surface of the arm or forearm. The needle goes into the skin shallow enough to permit the oval opening to be seen through the superficial layers of the skin. When the fluid is injected, a distinct wheal like elevation showing the openings of the hair follicles appears. The reaction is read at the end of 24, 48, 72 and 96 hours. A reaction consists in a slight redness appearing within the first 24 hours and reaching its maximum about the fourth day, then fading slowly to leave a brown scaling area which persists for from three to six weeks. Persons found susceptible by the Schick test can be immunized by vaccination. This is done by injecting 1 c.c. of a mixture of toxin-antitoxin. Preparations for vaccination are on the market. The material is injected subcutaneously at week intervals for three weeks. The dose for a child under 1 year is 0.5 c.c. Park has injected over 4,000. Immunity lasts at least three years. "No diphtheria has occurred in those so far immunized." After the first injection 80 per cent. of the susceptibles are immune. After the second 90 per cent. and after the third, 97 per cent.

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(3) Pub. Health Reports, May 16, 1919.

SMALLPOX.

Leicester Plan. A history of the much discussed Leicester method of controlling smallpox is given by J. C. McVail.[4] He shows that the prevailing practices for the control of smallpox in that city are much the same as those elsewhere, that the method originally employed has been greatly changed, and, that Leicester has not been free from smallpox as is sometimes claimed. Leicester decided in 1842 not to carry out the vaccination law. In 1851 not half the population was vaccinated. Therefore, when in the epidemic of 1872 they voted to defy the vaccination act they were not a well-vaccinated town as is usually stated.

The five points of the original method were:

(*a*) "Without recourse to vaccination." A considerable percentage of the population are vaccinated. At one time it was estimated that 62 per cent. were thus protected. A majority are always protected. They do not vaccinate infants by compulsion, but adults and older children are very well protected by vaccination. The three health officers during the last forty-seven years (since 1872) believe in vaccination, practice it and advise their people to make use of it.

(*b*) "The method was entirely voluntary; there was no compulsion." This referred particularly to hospitalization. The records show that hospitalization of smallpox is on the same basis in Leicester as elsewhere in England.

(*c*) "The same hospital was used for smallpox and all other infectious diseases at the same time." This part of the Leicester plan was abandoned two years after it was adopted.

(*d*) "The same hospital was also used for the voluntary quarantining of contacts." This method was abandoned.

Since the Leicester plan was supposed to have been put in force in that city in 1872-3 they have had about the usual amount of smallpox. In proportion to the prevalence of smallpox in Great Britain or in London,

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(4) Brit. Med. Jour., April 5, 1919.

Leicester stood worse in the epidemics of 1892-3 and 1903-4 than it did in 1870-73. In 1892-93 they had 355 cases and in 1903-4, 715. In 1903, Dr. Millard, the health officer, vaccinated 800 of 1,084 contacts. During the last thirty years the smallpox has been of the American mild type. Should smallpox of the severe European type get into England it will produce grave trouble.

British Statistics. C. K. Millard[5] quotes the following figures given by McVail to prove that smallpox in England and Wales has become a disease of no consequence.

Death from smallpox by decades:

1867-76	58,614
1877-86	18,026
1887-96	4,892
1897-1906	4,763
1907-1916	139

He stated that his only opposition to the accepted practice consisted in opposition to compulsory infant vaccination. He is opposed to compulsory infant vaccination because the smallpox is so rare that there is no danger to infants. The disease is now a disease of adults. In order to set at rest for all time misunderstandings as to his and the Leicester opinion he gives his creed as follows:

"Vaccination as a procedure for conferring complete temporary immunity to smallpox will live forever and will always remain an outstanding achievement to the credit of British medical science. It will always be of the greatest service in combating outbreaks of smallpox and it robs such outbreaks of their terrors. But compulsory infant vaccination is discredited and rapidly becoming obsolete."

ANTHRAX.

Anthrax from Brushes. In consequence of the considerable number of cases of human anthrax due to infected shaving brushes, an anthrax committee[6] reports

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(5) Brit. Med. Jour., April 19, 1919.
(6) Jour. Royal Sanit. Inst., February, 1919.

that the following method of disinfecting wool, hair and hides is efficient in killing anthrax bacilli and spores, and is economical as well:

The steps are:

1. Mechanical and chemical washing.
2. Disinfection for twenty minutes with a 2 to 2.5 per cent. solution of formaldehyde at 102° F.
3. Air drying at 160° F.
4. Standing for some days.

The fibers are not injured.

TUBERCULOSIS.

The War and Tuberculosis. J. A. Miller[7] says that from the standpoint of increase of tuberculosis during the war, Belgium, Germany and Austria-Hungary are in one class and Great Britain and France in another.

In France a report by Landouzy was responsible for great and unnecessary alarm. Landouzy greatly exaggerated the amount of tuberculosis in the French army. Later Rist and others disproved the statements of Landouzy, statements which formed the basis of Biggs' report in this country. The statistics of Paris do not show any increase of the tuberculosis death-rate since the beginning of the war. However, the clinicians are of the opinion that the disease has increased.

Miller found no evidence of under-nourishment and no scarcity of food in France except in the invaded regions. There has been some food scarcity since the war ended.

In Great Britain there has been a distinct increase in tuberculosis, but it has not been great.

In Belgium there is no question as to the increase of tuberculosis, especially among children and in the industrial centers. The people have been trying to live on from 1,800 to 2,000 calories a day and such undernutrition must mean a great increase in tuberculosis.

In German cities of more than 200,000 inhabitants and in which over 11 million people in the aggregate

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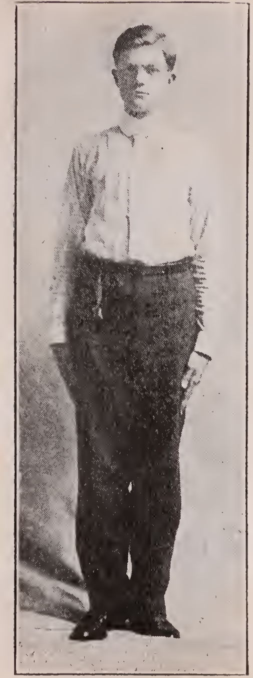
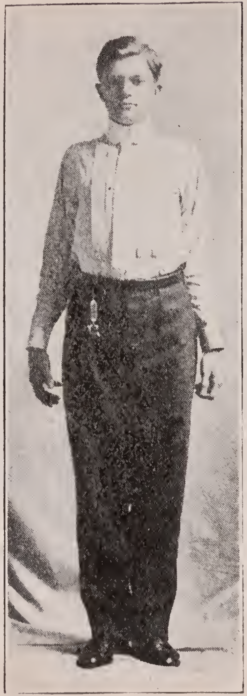
(7) New York Med. Jour., Aug. 9, 1919.

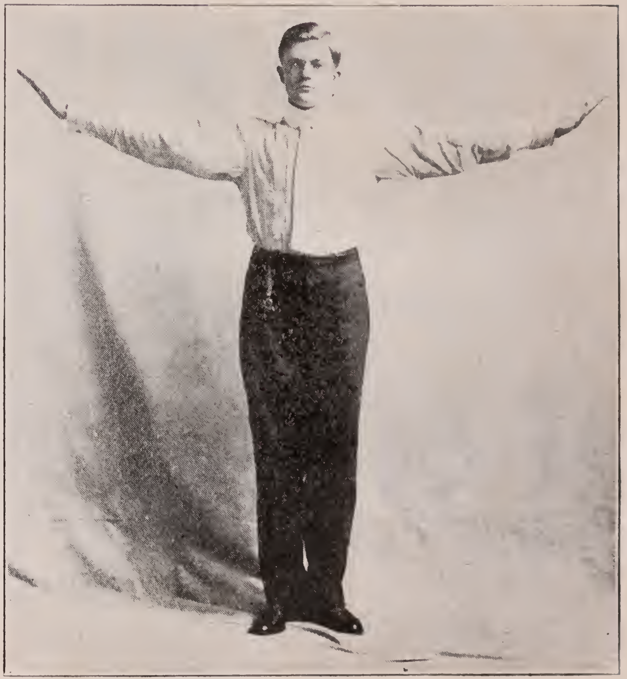
PLATE V.



A—**Original position.**

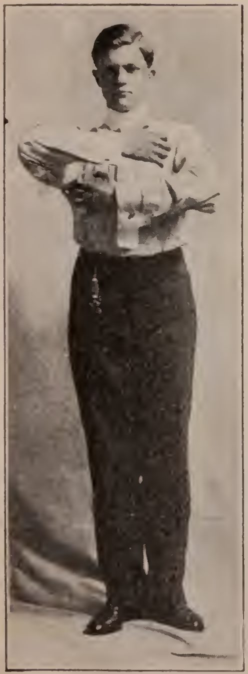


B (first exercise)—Raising the shoulders.

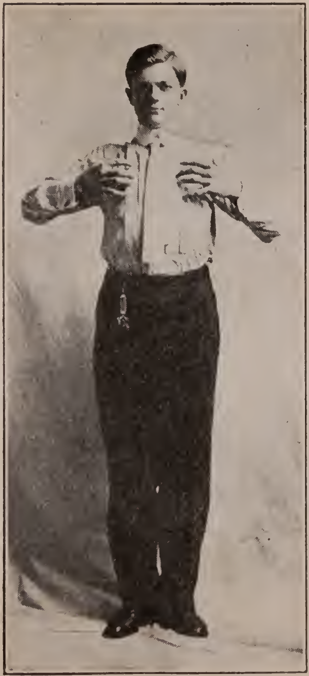


C (second exercise)—Arms horizontal.—Knopf, page 340.

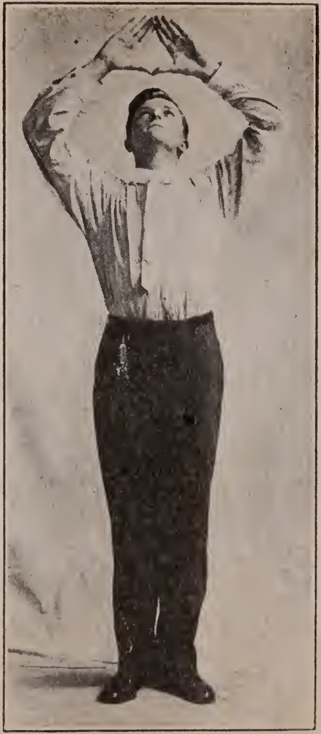
PLATE VI.



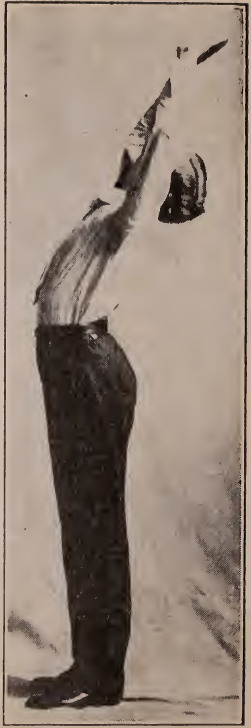
A (third exercise)—
Arms in front of chest.



B (third exercise)—
Tapping the chest.

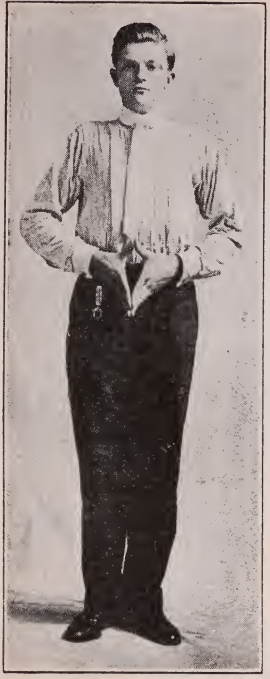


C (fourth exercise)—Arms
above head.

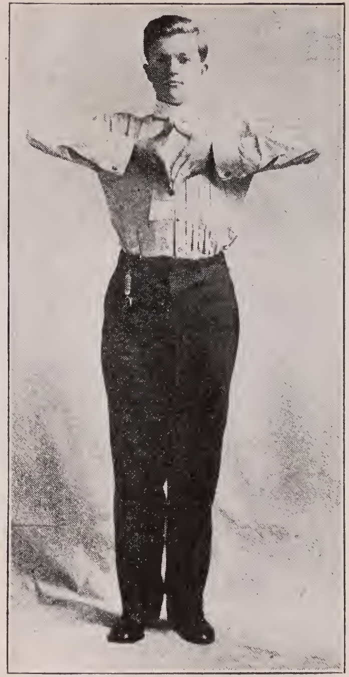


D (fourth exercise)
—B[illegible]g backward.
—K[illegible] page 340.

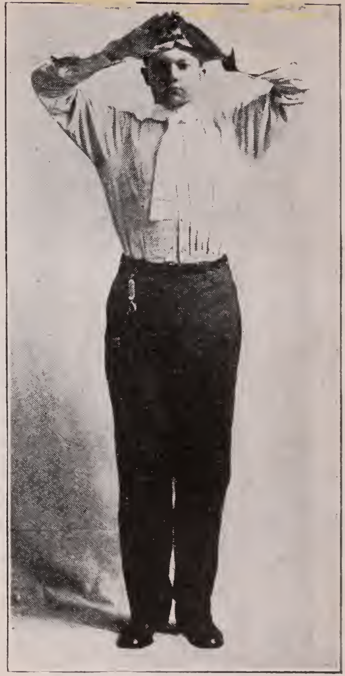
PLATE VII.



A (fifth exercise)—Hands in front, little fingers and edges of palms touching the abdominal muscles.

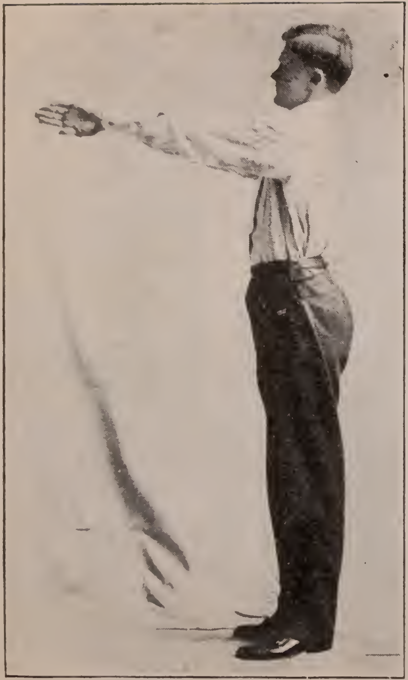


B (fifth exercise)—Hands upward from abdominal position.

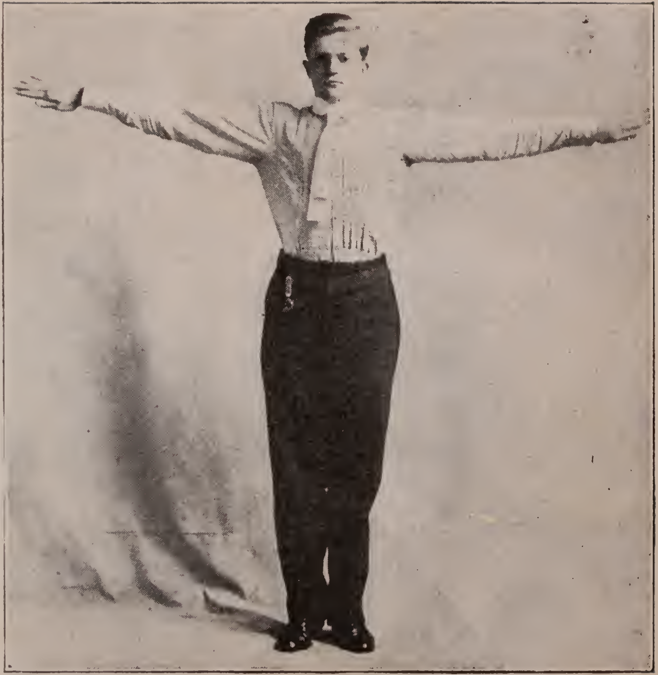


C (fifth exercise)—Hands raised from chest and turned.—Knopf, page 340.

PLATE VIII.

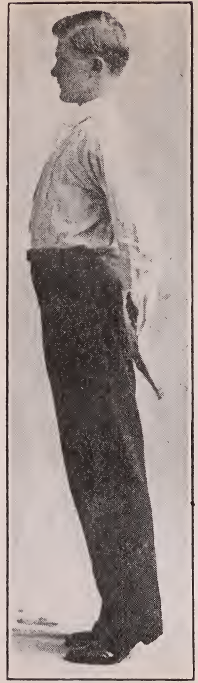


A (sixth exercise)—Arms as in swimming.

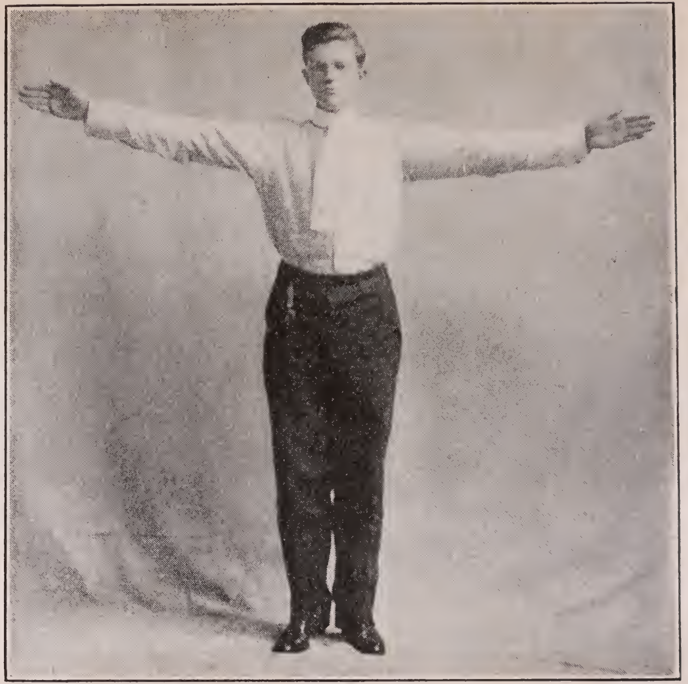


B (sixth exercise)—Arms moved outward.—Knopf, page 340.

PLATE IX.

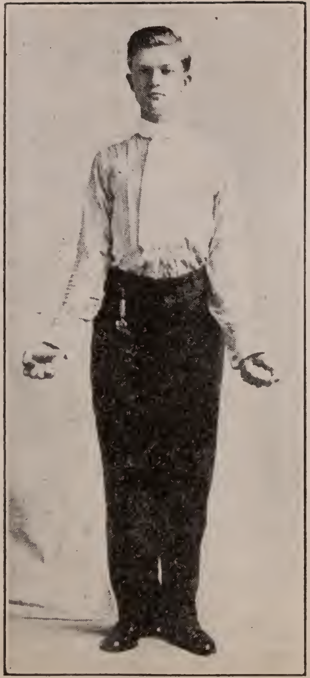


A (sixth exercise)—Arms meeting behind the back.

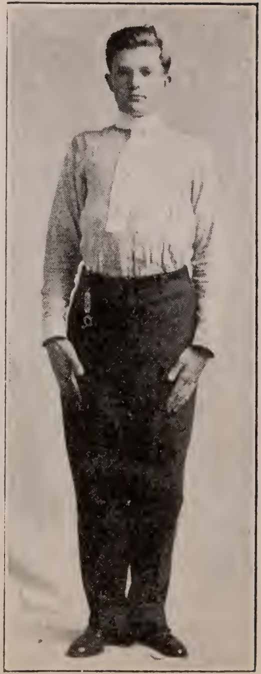


B (sixth exercise)—Arms again forward.—Knopf, page 340.

PLATE X.



A (additional exercise)—Expiratory effort, arms outward.



B (additional exercise)—Inhalation. — Knopf, page 340.

live, the effect of the war is shown by the following comparison of birth and death rates:

Birth Rates—11 months.

	Cities	Berlin
1913	20.9	17.9
1916	12.3	11.6
1917	10.9	9.9

Death Rates—11 months.

	Cities	Berlin
1913	12.2	12.3
1916	14.9	18.2
1917	17.9	23.

Tuberculosis Rates—11 months.

	Cities	Berlin
1913	1.5	1.7
1916	1.6	2.6
1917	2.3	3.1

There is not much information as to Austria-Hungary. Mallet says that in groups in which in 1913 there were 7,311 deaths from tuberculosis there were in 1917 11,755 deaths.

The United States suffered so little from the war, the economics of its people were so little disturbed that no increase of the tuberculosis rate as a result of the war is anticipated.

Miller draws certain conclusions from his observations on soldiers and civilians in the warring countries. There is very little danger of overwork causing tuberculosis provided the individuals are living and working in the open air. The experiences of the war indicate that we have over-emphasized the importance of trauma, injuries, ordinary infections and inflammations in causing tuberculosis. The army examiners proved that a rapid examination for tuberculosis was reasonably reliable clinically. The very careful detailed examinations often given reveal chest conditions of no particular clinical significance. The condition of nourishment of a people is a major factor in determining the amount of tuberculosis among them. The development of industrial hygiene is certain to lessen the amount of tuberculosis in the working classes.

The v. Pirquet Test. A. K. Krause[8] thinks that the von Pirquet test deserves to rank with the discoveries of Villemin, Laennec and Koch making the four great discoveries in tuberculosis. The epoch-marking gain from the von Pirquet test was the demonstration that practically all adults have some tuberculosis infection and therefore that infection with the bacillus was less important than the factors which made the infected man become clinically tuberculous. Krause says that it has always been his impression that by the time the average man comes to his physician because of tired feeling, cough or lack of endurance he is already fairly thoroughly tubercularized. The more frequent "strain" producers which cause resistance to break are pregnancy and labor, intercurrent disease, sudden, intense or prolonged and more moderate physical effort, emotions such as anger or worry, abnormal habits or dissipation. The improvement in the tuberculosis rates he attributes to the gradual betterment of the conditions of labor and living of the masses of the people. The fall in the rate began as the comfort and ease of the masses reached a certain level. Education should teach the importance of avoiding strain, that it is the oil to the lamp, the infection being merely the wick. Krause does not think much of early diagnosis as a measure of control.

State Control of Tuberculosis in France. The Academy of Medicine, after a heated discussion lasting through eight weeks, adopted the following resolutions by M. Bezancon[9] as to state control of tuberculosis in France:

1. Public interest demands that all cases of open tuberculosis be reported as soon as the diagnosis is established.

2. The reporting will be addressed to a health physician—and will be held as a professional secret—who will execute measures of prophylaxis only on request of the physician in attendance.

3. The declaration carries with it an obligation on

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(8) Bull. Johns Hopkins Hosp., March, 1919.
(9) Bull. de l'acad. de méd., May 20, 1919.

the part of the public to care for the necessitous sick and their families.

These three resolutions carried by a vote of forty-six to twenty-one. Another set of resolutions adopted read:

Only prophylactic measures can have rapid results and these can be taken without reporting cases. The prophylactic measures consist in:

1. Fighting alcohol and limiting cabarets.
2. Teaching hygiene in the schools.
3. Housing reform.
4. Creation of workers' cities outside the great centers.
5. Sending children menaced by tuberculosis to the country.
6. Disinfection of all premises by the proprietor before a new tenant comes in.
7. Establishment by the state of social insurance similar to the measures in vogue in England and Germany.

After these amendments were adopted Hayem's original report was adopted:

1. The academy demands that the method of child conservation in operation in Paris be extended to the rural districts. Attention is also called to the necessity for sanitary regulation of slaughter houses, stables, and foods especially those exposed to street dust and to insects.
2. The Academy informs the powers that efforts in behalf of persons with tuberculosis constitute only a part of the fight. Among measures which should be adopted are housing, repression of alcohol and of syphilis, and health insurance.

The proposal to recommend an institute of hygiene went over until a later meeting.

[This report was discussed at great length by the Academy. The bulletins for many weeks are filled with the discussion. To those in this country who decided this question ten years ago or more most of the discussion sounds familiar. Most of the arguments against reporting and most of the predictions of failure or even disaster in the wake of, and due to, reporting were disproven here so many years ago that the statements and predictions have been almost forgotten.—Ed.]

Exercises for Convalescent Soldier Consumptives. It is suggested by S. A. Knopf[1] that many of the blinded veterans be trained in massage and that they be given employment in massaging convalescent consumptives. To prevent relapse after arrest or apparent arrest of the disease, the patient should be hardened before he is turned loose. This hardening consists of daily massage, hydrotherapy and breathing exercises. The breathing exercises are not to be begun until the pulmonary lesions have become wholly inactive. Otherwise acute exacerbations are liable to be determined.

The hydrotherapy is given by having the patient stand in a tub in 5 inches of water at a temperature of 105° F. A sponge is used to apply cold water to the back of the neck, the thyroid and the shoulders. At the beginning, the temperature of the cold water is 85° F. The temperature is lowered 5 degrees on each fifth day until 40° F. is the temperature of the water made use of. The sponging occupies less than five minutes. After the sponging, the body is quickly dried and the patient hops into a warm bed. If there is no satisfactory reaction the use of the baths should be discontinued.

Exercise 1. Stand at attention. Breathe deeply and pull the shoulders and elbows back. Hold the breath four seconds. Exhale and roll the shoulders forward (Plate V, A and B).

Exercise 2. Stand at attention. Inhale deeply, mouth closed. Raise the arms laterally to horizontal position. Hold breath 4 seconds. Exhale and return to attention (Plate V, C).

Exercise 3. Place each hand on opposite breast. Inhale deeply. Carry shoulders and hands backward. Count 4 by tapping chest 4 times with hand. Exhale. Carry arms to first position (Plate VI, A and B).

Exercise 4. Standing at attention raise arms laterally to horizontal position until hands meet just above head. Bend head and trunk backward. Breathe deeply.

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(1) Jour. Amer. Med. Ass'n., Feb. 22, 1918.

Hold breath 4 seconds. Exhale. Carry arms to sides. (Plate VI, C and D.)

Exercise 5. Standing. Have the hands meet in front of abdomen (Plate VII, A). Carry hands upward in front of abdomen, chest and face as the subject inhales deeply and draws the abdomen up as much as possible. Exhale. Lower the arms (Plate VII, B and C).

Exercise 6. Is practically the same as swimming with the breast stroke. Deep breathing being practiced simultaneously with the exercises (Plates VIII and IX).

TRENCH FEVER.

Transmission of Trench Fever. The observations of McKee, Renshaw and Brunt that trench fever can be communicated by intravenous and intramuscular injections of blood, and also the other findings of the War Office Committee on Trench Fever and of the American Red Cross Research Committee, are confirmed by J. A. Arkwright, A. Bacot and F. M. Duncan.[2] De Rocha-Lima was probably the first to suggest that Rickettsia bodies were the probable cause of the disease. Arkwright, Bacot and Duncan conclude that the intimate association in lice of rickettsia with the virus of trench fever is proven. Whether rickettsia constitutes the virus of trench fever or in some way is produced by it remains undecided, because rickettsia can not be cultivated on artificial culture media. While rickettsia may not be living microörganisms their appearance certainly suggests that they are bacteria and their remarkable association with trench fever virus in the louse further suggests that they are the causal agent of trench fever.

Virus of Trench Fever. The report of the Medical Research Committee of the American Red Cross[3] on trench fever is that the disease is due to a filterable virus and is not related to typhoid or paratyphoid, and that it is due to the body louse. The virus is found in

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(2) Jour. Hygiene, April, 1918; Practical Medicine Series, Vol. I, 1919, p. 116.

(3) Oxford Univ. Press, 1918.

the blood plasma. The louse may infect either through its bite or by reason of its feces being scratched into the skin. The experimenters succeeded in producing the disease by using the blood of patients. They obtained results from whole blood, titrated blood, whole plasma and washed blood cells, and also by using urine and sputum from trench fever patients.

SPIROCHETOSIS ICTEROHEMORRHAGICA.

Infectious Jaundice. A. S. Griffith[4] has confirmed the conclusions of the Japanese bacteriologists, Inada and Ido, that a serum obtained from cases of infectious jaundice and also from horses inoculated against the disease had curative powers. The serum was spirochetocidal and spirochetolytic.

TYPHOID AND PARATYPHOID FEVERS

Typhoid and Paratyphoid in the A. E. F. In the early part of 1919, W. D. McCaw[5] reported that there was an unexpected amount of typhoid and paratyphoid fevers among the A. E. F. Most of this developed among troops engaged in the severe battles on the Western Front and was the result of the necessary letting down of all sanitary requirements. From June 1, 1917, to June 1, 1918, there was practically no typhoid. In July, 1918, a replacement unit arrived from New Mexico infected to a considerable degree by drinking water *en route*. In August, a small epidemic occured in an engineering command. After the Chateau Thierry, St. Mihiel and Argonne offensives considerable typhoid, diarrhea and dysentery developed.

Col. McCaw thinks that all further tendency towards epidemic conditions can be overcome. He, therefore, issued a special order holding medical officers to a strict accountability for typhoid in their commands. His summarized recommendations and his instructions for the use of typhoid-paratyphoid lipovaccines follow:

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(4) Jour. Hygiene, April, 1919.
(5) Pub. Health Reports, March 28, 1919.

1. Upon the occurrence of a single case of typhoid or paratyphoid fever in a command, re-investigate all the above conditions and correct any deficiencies in the barrier of protection above described.

Examine all vaccination records and administer a single dose of triple lipovaccine to all in whom there is the slightest doubt concerning completion of required vaccination.

Request bacteriologic carrier examination of your kitchen personnel from the nearest available laboratory. This had best be done through the responsible sanitary authorities.

Before this has been done re-inspect your kitchen personnel and remove all who give a history of recent diarrhea or other intestinal disturbance.

Prohibit the use of all uncooked vegetables and unboiled milk.

Investigate the conditions of the neighboring civilian population as to prevalence of typhoid or typhoid-like fevers.

2. When two or more cases occur in the same command within the same two weeks, revaccinate the entire command in addition to the above precautions. If the outbreak takes on epidemic proportions, add to these precautions the handwashing of all men after defecation.

Further measures of control must be determined after epidemiologic study of the individual situation.

Whenever typhoid or paratyphoid fever occurs in any command, the medical officer will address the officers and the men, at either roll-call or retreat, instructing them in the mode of spread of intestinal diseases, in the seriousness of the situation and in the simple methods of personal hygiene, the importance of cleanliness, and the purposes of the sanitary regulations instituted for control of these diseases.

3. The special attention of all officers of the Medical Department is invited to sections 184 and 185, Article III, Manual of the Medical Department. Compliance is enjoined.

4. All previous instructions from this office in conflict with regulations prescribed herein are rescinded.

(A copy of these instructions will accompany each shipment of Vaccine.)

Directions for Vaccination with Triple T. A. B. Lipo-Vaccine.

1. *Records.*—(*a*) Prepare a list in duplicate of the officers and men of the organization, giving name, serial number and rank. Inspect all those appearing on the list, taking the temperature of any individual who looks sick. No person will be vaccinated who is not in perfect health and free from fever (99.6 degrees F. or over). Keep a record of those who are not vaccinated because of temporary unfitness, and when they are in good physical condition, vaccinate them.

(*b*) Enter upon the service record and upon the individual pay book the date of vaccination and the type and dose of vaccine given.

2. *Dose.*—A single dose of 1 c. c. of the Triple T. A. B. lipo-vaccine fulfills the vaccination requirements.

3. *Procedure.*—(*a*) Sterilize the skin with tincture of iodine; warm the vaccine to body temperature to facilitate the flow of the oil; do not overheat (when the vaccine stands in the cold a precipitate may appear, which will disappear on warming).

(*b*) Shake the ampoule well before loading the syringe.

(*c*) It is necessary to use a large bore needle (with a well sharpened point, the large bore needle causes no more pain than a small bore needle).

(*d*) *The injection is to be given subcutaneously*, not intramuscularly or intracutaneously; special care must be taken to avoid introduction of the vaccine into a vein; raise a fold of the skin between the thumb and finger, pass the needle at least one-half inch through the skin into the subcutaneous tissue and then inject the vaccine into the subcutaneous tissue of the fold.

(*c*) The puncture opening in the skin made by the large size injecting needle tends to permit escape of the oil; to prevent this, press a small iodine swab firmly against the puncture hole for a few minutes or until exudation from the hole has ceased; this procedure will prevent the occurrence of superficial infections which are apt to follow if the puncture hole is permitted to remain open and the clothing is immediately pulled down over it.

4. *Aftercare.*—(*a*) Avoid rubbing or massaging the site of the injection.

(*b*) Abstinence from alcoholic drinks must be enforced for two days after the inoculation.

(*c*) It is advisable to give the vaccine in the afternoon, and to relieve those vaccinated from duty for at least 24 hours, and, if local or systemic reaction persists, for a longer period.

Water-Borne Typhoid Outbreak in Herkimer, New York. Herkimer, a manufacturing village more than

100 years old, is located in the rich dairying section of the Mohawk Valley. It is a manufacturing and trading town located in a farming district. The people get their water from wells, but in August, 1918, the city had grown so that supplementary water supply was found necessary and pending the completion of new wells creek water was pumped into the main beginning Aug. 28, 1918.

By the end of the first week in September, cases of typhoid were beginnig to develop, and by October 1 the state board of health had heard of the epidemic. T. Horton[7] reports that while chlorinating was begun in August it was not properly done until he, as state engineer, took charge November 25. Since that date there has been no typhoid except a very few contact cases.

Investigation showed the water of the creek to be so badly polluted that heavy chlorinating done by capable men and closely supervised by laboratory tests was a requisite for safety. This was not the policy followed prior to November. On some days, no chlorinating was done. On other days, the creek water was chlorinated but not the well water nor mixtures of the two. On still other days the dose of chlorine used was altogether inadequate.

One hundred and fifty-five cases of typhoid were investigated. Some were contact infections but most were caused by water. The cases were rather evenly distributed among the milk companies in proportion to the size of the trade of each.

The teachings of this experience are:

1. Even a badly polluted water supply may be used by a community provided chlorination is done by experienced men and is checked by frequent laboratory tests.

2. The use of a badly polluted water supply is hazardous unless there is the right kind of chlorination.

3. Chlorination improperly done may be confusing and dangerous.

4. In the presence of an epidemic the water should

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(7) Pub. Health Reports, March 28, 1919.

be boiled until the cause of the epidemic is located and remedied. To which we might add that in the same emergency vaccination should be done and the milk should be pasteurized.

One Dose Vaccination. Commenting upon the shortcomings of a multiple dose of vaccine, E. R. Whitmore[8] says that if 500 people in civil life take the first dose of typhoid vaccine only 300 will take the second and 100 the third. In doing typhoid vaccination, a total of two billion organisms must be injected to give an immunity which lasts one year. It is difficult to give so large a dose if other organisms are combined with the typhoid; for instance, several paratyphoids, and the vaccine is given in saline suspension. The advantages of lipovaccine is that the vaccination can be done at a single sitting. The organisms being less toxic much larger doses can be given and, the tendency to autolysis being much less, the vaccine will keep much longer. Lipovaccines are still potent at the end of eight months as compared with three months for saline suspension. While lipovaccines have advantages as protective organisms they are at a disadvantage when employed for purposes of cure.

MALARIA.

Disinfection as a Means of Control. If all cases of malaria were treated until they were sterile, says C. C. Bass,[1] the sources of infection would end and theoretically there would be no malaria the following year. Not over one-fifth of the malaria is treated by physicians. The attached diagrams show the rate of decline of malaria which would result were physicians to disinfect all cases treated by them (Figs. 52, 53).

If the cases otherwise treated were sterilized a far better showing would be made.

The shortcomings of medical treatment, Bass treats under such heads as, spectacular methods of treatment,

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(8) Amer. Jour. Pub. Health, July, 1919.
(1) Southern Med. Jour., June, 1919.

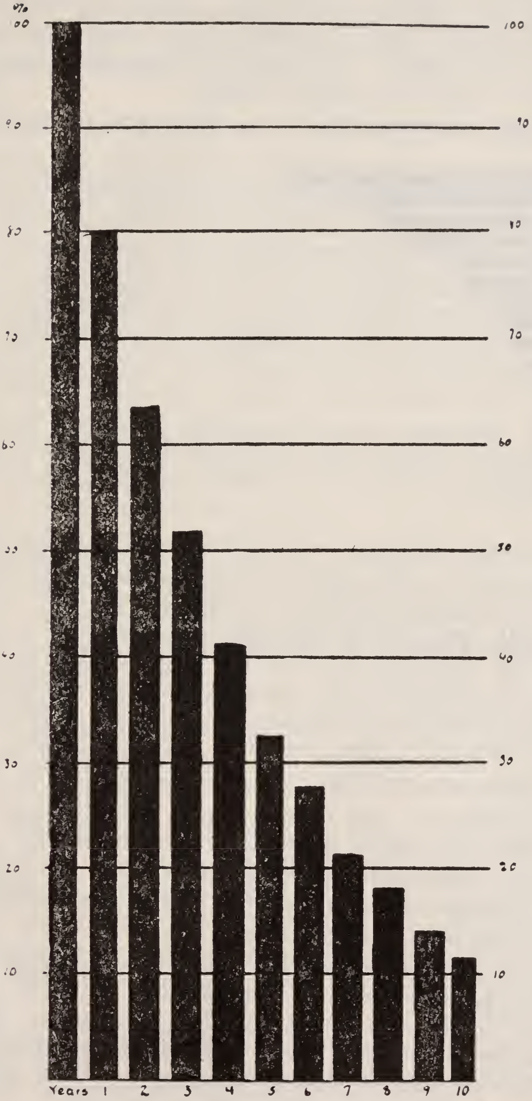

Fig. 52. Reduction of the amount of malaria that would result from disinfection of all cases treated by physicians.

not giving patients convincing advice as to treatment, not employing efficient treatment. (Efficient treatment to break the acute attacks consist of 30 grains of quinine a day for four days. Disinfecting treatment consists of 10 grains a night for eight weeks.)

[In Bass' calculations as to the rate of decline of malaria when properly treated, he takes no account of the tendency to spontaneous disappearance so cleverly worked out mathematically by Ross.—Ed.]

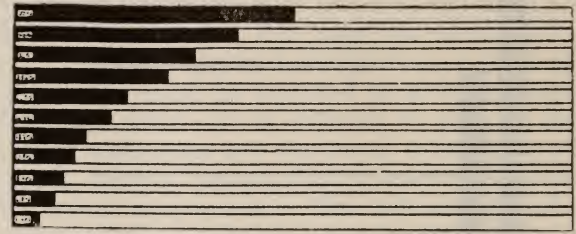

Fig. 53. The effect on the prevalence of malaria that would be produced in Bolivar and Sunflower Counties in ten years if all physicians disinfected all persons treated by them who have malaria.

Mosquito Control in Malaria Prevention. J. C. Geiger, R. E. Tarbett and C. C. Pierce[2] had charge of sanitation around Camp Pike near Little Rock, Arkansas and also of Eberts Field located near Lonoke, Arkansas. It is their opinion that malaria control work has made good, that it has not cost enough to be in any sense prohibitive, but that it must be continued or the results will be lost. Although the control of malaria in a rice district is more difficult they contend that around Lonoke—in a rice district—the ability to control malaria has been demonstrated.

In the Little Rock district, the area controlled by the combined agencies was 92 square miles in 1918. In this area $92,200.22 was spent by all agencies for all sanitary purposes between June, 1917, and December, 1918. The area was rather thinly populated before the camp

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(2) Jour. Ark. Med. Soc., March, 1919.

was located there. It was so badly infected with malaria that the army officers reported adversely on the site. The location of an army post was not secured until the people of Little Rock agreed to expend money in malaria control.

The method consisted in draining, cleaning and straightening of ditches, spraying oil on quiet waters, placing oil on running water with a drip can, reporting and adequate treatment of cases. The cost of the work in and about the camp and the munitions factory was 25 cents *per capita* for the two year's work. The cost of malaria work done in Little Rock and north Little Rock, July, 1917, to January, 1919, was 56 cents *per capita.*

Assuming that the malaria death-rate of the rural area under observation is the same as that of Little Rock and assuming that for every death from malaria there are 100 cases an estimate of 10,000 cases of malaria in the district in 1918 was given. Instead of that number 342 cases were reported and it was estimated that the number of cases did not exceed 600. One physician reported that in the eighteen months before this work was done he treated 142 cases of malaria but that in the eighteen months of the work he treated only eight. The army medical officer in charge at Camp Pike reported that none of the 200,000 soldiers who passed through Camp Pike developed malaria and no new cases of malaria developed among the workmen engaged in constructing the camp.

It is also noticeable that the malaria rate reached its maximum in August and steadily declined thereafter. This signifies that the people who carry malaria over through the winter develop the disease in the late spring and early winter. There was practically no new infection. Ordinarily, malaria rates peak in September and October.

The accompanying charts show an equally great gain in Little Rock. In 1911 192 deaths from malaria were recorded as against 16 in 1918 (Fig. 54).

The sanitated area in Lonoke County covered 12 square miles and embraced Lonoke and Eberts Field. In this area there were 2,400 people not including soldiers. In this area rice is extensively grown.

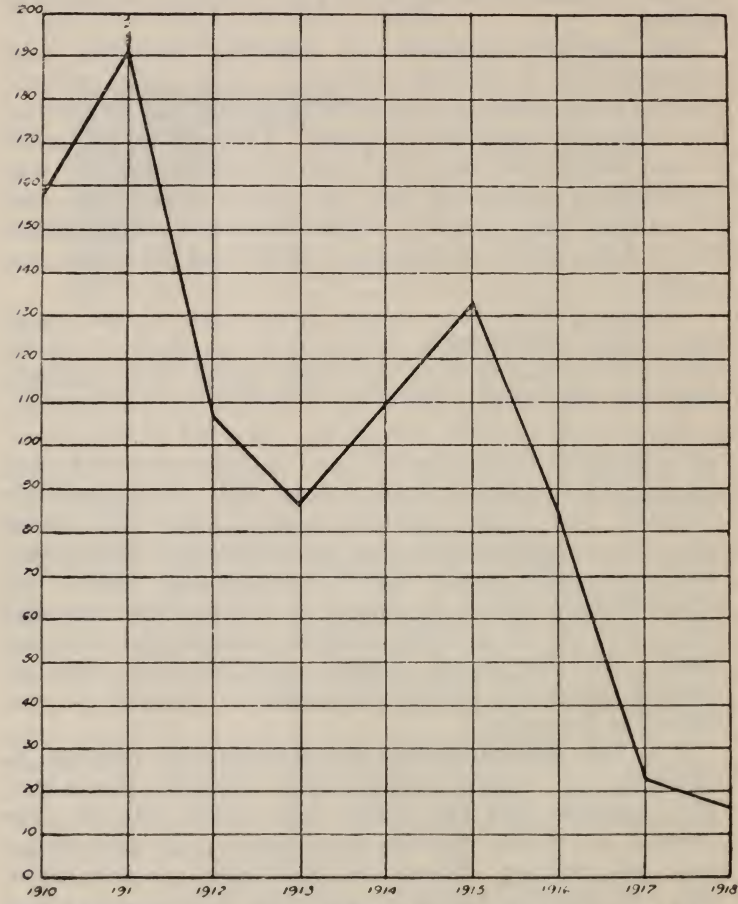

Fig. 54. Death rate per 100,000 from malaria, City of Little Rock, 1910-1918.

In addition to ditching and oiling, all houses were screened with 16-18 mesh screening. Each inhabitant had three blood examinations for malaria. In the spring ninety malaria carriers were detected. These were treated by giving 10 grains of quinine in capsules daily for thirty days. In September, none of the ninety was found to be a carrier. Malaria was completely eliminated although mosquitoes abounded. The cost was $19,107 or about $8 *per capita.* Some of the conclusions relative to rice fields were:

1. The best method of spreading oil is by scattering oil-soaked sawdust among the rice.
2. Top minnows are of no practical value in a rice field. They hang around the ditches.
3. Intermittent watering is not feasible.
4. Possibly aquatic insect larvae and some algae and slimes may be helpful.

Malaria in California. W. B. Herms[3] says that the antimalaria campaign in California has reduced the prevalence of the disease 60 per cent. He predicts that the next ten years will see the state entirely freed from the disease. Between 1909 and 1919, 796 deaths from malaria were reported. The campaign began in Placer County and in this county the disease has been reduced 85 per cent. Tchama County and Butte County, two other counties where campaigns have been run, show reductions of 76 and 70 per cent. respectively. Sacramento, Yolo and Yuba counties, where campaigns have been conducted, show reductions of 71.70 and 63 per cent. On the other hand, Shasta County where no malaria work has been done shows an increase in the rate and now leads the other counties. Eldorado County where likewise no work has been done shows an increase of 60 per cent.

YELLOW FEVER.

Yellow Fever. The evidence in favor of his claims to have discovered the organisms of yellow fever is presented by H. Noguchi.[4] The disease, as he found it at Guayaquil, is the disease as found elsewhere. By injecting blood from cases of yellow fever into guinea-pigs a disease closely resembling human yellow fever was

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(3) Pub. Health Reports, July 18, 1919.
(4) Jour. Exp. Med., June, July, August, 1919.

produced. Injections into a large number of other animals and many species of birds gave negative results. In the blood of the infected guinea-pigs a minute organism which he terms *Leptospira icteroides* was found. This organism closely resembles *Leptospira icterohemorrhagiae.* When the blood of infected guinea-pigs was injected into other guinea-pigs the same disease was produced. When a culture of *Leptospira icteroides* was injected into guinea-pigs and marmosets (and to a less extent in dogs) a disease clinically identical with yellow fever was produced. The pathology and histology of the infected animals was the same as in the case of yellow fever. Some guinea-pigs inoculated with *Leptospira icteroides* and having the disease in a mild form became immune to infection with that organism. *Leptospira icteroides* was cultivated in three out of eleven cases of yellow fever. The organism was cultivated from the blood. The organism is invisible under translucent light. It is difficult to stain. It will not grow in the same media with many other organisms. It grows well at a temperature of 25-26° C. remaining viable for several months without losing its virulence. It divides by transverse division. Blood serum is essential for its growth. It is killed by 55° C. for 10 minutes, by drying and by freezing and thawing. It is filterable. The blood of infected guinea-pigs became infected in 48 hours and was always infective after seventy-two hours. The liver and kidneys were infective according to the same laws. The organisms were found in the blood by the fifth day and were most abundant on the sixth and seventh days. Serologic tests demonstrated that a leptospira found in great numbers in wild rats in Guayaquil belongs to the same group as *Leptospira icterohemorrhagia* and differs from icteroides in many immunity reactions.

[The proportion of patients from whom Noguchi was able to obtain cultures was small. If he has found the causative organism it is evidently not well adapted to the culture medium employed. It is hoped that we may shortly have confirmation of Noguchi's claims.—Ed.]

SCABIES.

Scabies in the Army. F. C. Knowles[5] predicts that when the figures are available it will be found that skin diseases were responsible for a good deal of the disability of soldiers in the great war. Since nits of body lice have been found on the body hairs, treatment should be begun by shaving the hairs from the axillae and pubes. Then calomel prophylactic ointment (30 per cent, calomel in some fat such as lanolin or cocoa butter) is applied. The patient bathes and has the clothing sterilized by heat.

Scabies leads all other skin diseases in frequency. At first twelve days were required to cure scabies. The last fifty cases admitted were cured in 4.6 days.

Method of treating scabies:

1. Friction of entire body except face with green soap. Friction lasts twenty minutes. Rub especially the spaces between the fingers, the wrists, elbows, knees, axillae and pubes.
2. Hot bath for twenty minutes. Continue scrubbing with soap and brush.
3. Dry the body and rub with a rough cloth and soapy water. Especial attention is given to space between fingers.
4. Apply for fifteen minutes to entire body except face and scalp ointment consisting of 20 per cent. sublimated sulphur combined with 10 per cent. neutral potassium carbonate in lard. Rub in well.
5. Put on clean pajamas and socks. Wear until the morning of the next day. Re-apply ointment to hands, elbows, axillae and groins.
6. Twenty-four hours after first friction wash off ointment with castile soap and water. This bath lasts fifteen minutes. Dry the skin and dust with starch powder. Dress in sterilized clothes. Knowles thinks a 12.5 per cent. solution of sulphur better for use in America. In many army camps the sulphur ointment was rubbed in daily for three days.

Scabies at Embarkation Hospital. The method of

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(5) Military Surg., August, 1919.

treating a small epidemic of scabies at an embarkation hospital are given in detail by C. G. Lane.[6] There were 102 cases and treatment lasted 6.2 days on an average. Of the 102 men only three were later re-admitted for recurrence. The treatment starts the first night with a vigorous scrubbing with soap and water under a shower. A brush is used and the man is told to get the "tops and scabs off." After this the man thoroughly rubs in an ointment, covering the entire skin below the chin, paying special attention to the hands, axillae and genitals. The ointment used is made of from 4 to 8 grams balsam of Peru to 30 grams of official ointment. A small amount of betanaphthol in this ointment improves it. The next morning the man takes a bath and is given clean pajamas and clean sheets. A light application of ointment is made. The morning treatment is repeated each day the man is in the hospital. All linen, body and bed, are sterilized by heat. Men leaving the hospital must boil all underclothes, towels and socks.

VENEREAL DISEASES.

Measures for Control of Venereal Disease in Great Britain. L. W. Harrison[1] expects to find an increase in venereal disease in Great Britain at least after the war because of the greater economic independence of women. In one hospital 83.5 per cent. of 1,288 cases of syphilis; in another 66.4 per cent. of 1,188 cases, of venereal disease of all kinds, and in a third 6.46 per cent. of 5,691 cases of venereal disease were infected by amateurs. Professional prostitutes do not spread so much venereal disease as do amateurs.

In Great Britain a very large number of women have gone to work at industry. An indirect result of this fact, according to Harrison, will be an increase in the number of women sexually lax but not living by prostitution.

Intercourse with an infected person is almost certain

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(6) Military Surg., January, 1919.
(1) Jour. State Med., Jan., 1919.

to infect a woman. The anatomic reasons for this are easily recognized. On the contrary, such intercourse is not very liable to infect a man. Both the *Spirocheta pallida* and the gonococcus perish easily. One-half of the intercourses which men have outside of wedlock are with infected women, yet the percentage of infection has never been put higher than 7.4 and is perhaps lower.

Harrison strongly favors preventive treatment. This consists in:

1. Washing with soap and water.
2. Washing with bichloride solution.
3. Urethral injection of 2 per cent. protargol or 10 per cent. argyrol (retained 3 minutes).
4. Inunction with 30 per cent. calomel ointment.
5. Wrapping the penis in toilet paper.

A method employed in the British Army consists in: (1) Washing with 1/1000 permanganate; (2) the use of a small tin tube containing calomel cream in two consistencies. The cream contains 30 per cent. calomel and 25 per cent. thymol. When a pin prick is made in the tube, the nozzle is inserted in the urethra and a little oil is injected. Then the remainder or more solid part is used to smear the external parts. The use of the preventive within the first hour gives results that are about 99 per cent. perfect.

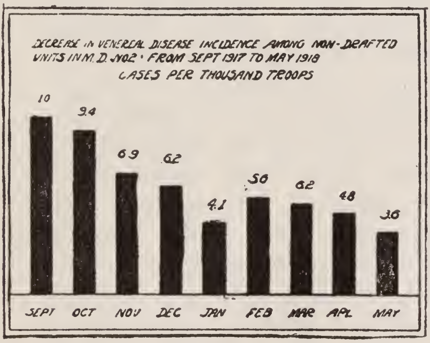

Fig. 55.

Harrison also advocates the abortive treatment of gonorrhea. He says that the disease will be aborted in 90 per cent. of cases if treatment is begun with the first onset of symptoms. The abortive treatment consists in urethral injections or organic salts of silver.

[An outstanding feature of the year is the rapid development of anti-venereal work among civilians by Federal, State and local authorities. The work of Olin in Michigan has been especially productive. Most of the literature on this subject during 1918-19 has been of the propaganda type. The Year Book for 1920 should chronicle accomplishments.—Ed.]

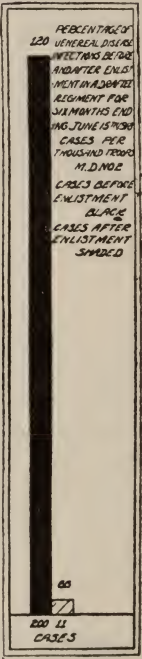

Fig. 56.

Venereal Disease a Civilian Problem. Gordon Bates[2] says that venereal disease is very much more of a civilian than a military problem (Figs. 55 and 56).

The quicker the civilian population adopts the entire military program the more promptly will these diseases be brought under control. Among the measures are reporting, proper diagnosis and treatment, prophylaxis, wholesome entertainment and education. To begin with, reporting must be by number, but this will be followed by reporting by name. Bates says that investigation shows that venereal disease has been badly diagnosed and badly treated. Most chancroids are in reality chancres; 90 per cent. of men with penile sores eventually show a positive Wassermann reaction. Cases of syphilis without symptoms are not uncommon. All diagnosis of ulcers should be by examination for spirochetes. If diagnosis is made by this means and active arsenical treatment is inaugurated at once 50 per cent. of the cases can be aborted. Acute gonorrhea may be absolutely cured in less than a week by means of the Ballinger sealed-in treatment. The treatment is not generally applicable unless undertaken twenty-four hours

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(2) Canadian Med. Assn. Jour., April, 1919.

after the appearance of the first symptom. When commenced thus early, 90 per cent. of cases will be cured within a week.

MISCELLANEOUS DISEASES.

Intestinal Parasites in Troops. The investigation of 35,000 troops for intestinal parasites is reported by B. Luckie.[3] The troops came from Kentucky, Alabama, and Tennessee. 8,653 were colored; the others were white.

The method used was as follows: Before breakfast, 15 c.c. of a saturated solution of Epsom salts were given. Newspapers were placed on wooden boards and on these the men defecated. A bit of feces was transferred to a pill box with a wooden spatula, the box was labelled and the soiled newspaper was thrown into a garbage can and later burned. The specimens were examined the same day. The specimen was transferred to a slide and examined with a low power lens. Water was added if necessary. It was found that centrifuging gained nothing.

Of the white soldiers, 10.4 per cent. were found infested as compared with only 1.1 per cent of the negroes. Among the whites 4.82 per cent. had ascaris lumbricoides (round worm); 4.24 per cent. *Necatur americanis* (hookworm); 1.25 per cent. trichuris (whipworm); 0.8 had *Hymenolepis nana* (a form of tapeworm) and a few had *Tenia saginata* and strongyloides. Among the negroes ascaris was the most frequent form, hookworm, trichuris and dwarf tapeworm tying for second place. It is suggested that perhaps antibody formation is responsible for the greater freedom of the negroes from infestation with worms.

Drug Addiction. A. D. Greenfield[4] divides all methods of curative treatment of drug addiction into ambulatory and institutional. Institutional treatment is defined as a treatment in which, if narcotic drugs are used at all, they are administered by a physician or by

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(3) Military Surg., June, 1919.
(4) Pub. Health Reports, July 18, 1919.

a nurse under a physician's direction. By ambulatory treatment is meant so-called curative in which the physician prescribes for or issues to the patient the narcotics which he uses himself. Under the ruling of the supreme court in the Doremus case, institutional treatment of drug habit even by the use of narcotic drugs is clearly legal. Investigations have shown that the ambulatory treatment of drug addiction is practically never successful. The right of a physician to make use of it is not consistent with good morals and there is a growing tendency of the courts to declare it illegal under the Harrison law. The physician employing it places himself in the power of his patient and reputable physicians can not afford to run the risk. Under the Harrison Act, physicians have the right to prescribe narcotic drugs. If the patient contracts a habit it is a matter of conscience with the physician for how long and under what circumstances he will supply the drug. After a certain length of time the authorities will begin to question his right and good faith.

T. S. Blair[2] suggests that the only satisfactory method of handling the narcotic drug question will be to have a government monopoly of manufacture and sale. One person in each district should have the exclusive sale of these drugs, apportioning to each physician, dentist and druggist his proper supply and requiring an accounting for all sales. The Pennsylvania laws place the sale of narcotic drugs under the state board of health. In that state cities of 5,000 to 30,000 present the greatest difficulty. The traffic in drugs in the large cities is very well supervised. In the rural districts there is not much addiction. The trouble comes with the city in between.

In Pennsylvania codeine is the drug most used, morphine is second and then heroine. Cocaine is apparently going out of use. Most of the physicians violating the law are over 50 years of age. Veterinarians prescribe very little narcotics. The gradual reduction method of treatment of the drug habit is a failure.

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(2) Jour. Amer. Med. Ass'n., May 17, 1919.

The best results of treatment of drug habits in Pennsylvania are furnished by prisons.

Thyroid Disturbances. That goiter is a public health problem is the contention of Mayo Tolman.[5] This conclusion is based on the wide prevalence of the disease, its greater prevalence in certain districts and its rareness in others, its preventability and its curability, and its probable relation to the water supply, which last is almost universally accepted as a public health proposition. In St. Leger's treatise on goiter sixty theories as to its cause are discussed but forty-four of the sixty relate to water.

In Switzerland there are said to be 700,000 cases of the disease and in France 400,000. In one district in Styria, 10 per cent. of the population have it. The goiter districts in North America are parts of New Hampshire and New York, the Blue Ridge Mountains of Virginia, the Great Lakes Region and Edmonton, Canada. Tolman estimates that there are 12,000 cases in West Virginia. In Braxton County he found 1,148 cases or 5 per cent. of the population. About 2 per cent. of the cases are toxic.

In Italy, France and Switzerland conscripts sometimes purposely drink goiter-producing water until there is enough of the disease present to cause them to be rejected, whereupon they boil the drinking water or change to a new supply and get well.

In 1877 a certain area of Vienna was supplied with water from a goiter region in Styria but the onset of a large number of cases of goiter caused the authorities to abandon that source of water-supply whereupon the disease lessened. In Geneva the people who drink water in the lower parts of the town have goiter, while those who drink water from higher up escape.

In Deota, India, the Brahmins drink water obtained wholly from an old aqueduct. They have no goiter. During one-half the year the Rajpoots drink water from the source but during the remainder of the year they get water from local wells. They have some goiter. The poorer classes get water from local wells exclu-

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(5) Amer. Jour. Pub. Health, July, 1919.

sively. They have much goiter. Hippocrates attributed goiter to the drinking of snow water.

An Indictment of the Tooth Brush. *The Journal of the Indiana State Medical Association*[6] expresses the opinion editorially that some method of maintaining cleanliness of the teeth and mouth should take the place of the ordinary use of the insanitary and unhealthful tooth brush. They say this appliance has been responsible for more diseases of the teeth and mouth than it has prevented.

INDUSTRIAL HYGIENE.

Munitions Workers. George Newman, Thomas Barlow and their fourteen associates on the British Health of Munitions Workers Committee[7] make a final report which adds little in scientific material to their progress reports. In substance they report that the human machine should not be called upon to do as much as they said in their progress reports could be done with safety, but the report does not give evidence of further investigation. The outstanding feature of the work of this committee is that they undertook to determine the effects of fatigue and to solve such questions as hours of labor, Sunday work, day and night work, hours for women and children, by measures having some semblance of scientific accuracy.

[I may add that Lee and the American Committee appointed by the Council of Defense is pursuing somewhat the same methods. But speaking generally, hours of labor, over-time work, Sunday work and work for women and children are questions that are settled by the political rather than the scientific method.—Ed.]

The committee reports that conditions were much better in the later years of the war than earlier. A large part of the improvement was due to prompt action by employers and employees in accordance with the recommendations of the progress reports. The committee says that fatigue should be detected and its cause

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(6) March 15, 1919.
(7) Bull. U. S. Bureau of Labor Statistics, No. 249.

dealt with while it is still latent and before it becomes excessive. The tests of fatigue are diminished output, the failure of concentration as shown in increased accidents and spoiled work, staleness, ill health and lost time.

As to hours of labor, the committee finds that it is impossible to set a standard day for all men and all tasks. Men vary too much in their capacity to labor without fatigue and jobs vary too much in the strain entailed. In the progress report, the committee said the limit for men should be a 65 to 67-hour week. They now report in favor of shortening the week, but do not say how much, except that they will watch with interest the working of a 50-hour week in its effect on production and also on the health of the workingmen.

In the earlier report they set a 60-hour week for women. They now recommend that this be materially shortened. As to shifts they recommend the double shift as productive of more output than either the single or the triple shift. They oppose night work except in emergencies. It is expensive and wrong physiologically. Neither men nor women stand night work well. If there is to be night work it is best to change the shifts weekly. The night shifts are never so productive as those of the day. Sunday labor is unprofitable and expensive. Every worker should be compelled to take a long resting period between the end of one work day and the beginning of the next and, in addition, restful vacations should be enforced.

The proportion of lost time due to sickness is always under-estimated. Whenever there is more than 20 per cent. lost time in an establishment that fact should always call for an investigation. Whenever any individual has a record showing much lost time there should be a sociologic and, if necessary, a medical investigation.

From the point of view of munitions work, poisoning by T. N. T. is more important than anything else. Most T. N. T. poisoning is due to absorption through the skin.

Excessive drinking is responsible for most of the ills of working men. Methods to prevent heavy drinking have done much to make conditions better among British working men during the past two years.

The committee places great stress on the advantage of well-organized departments in all industrial establishments.

T. N. T. Poisoning. At least two or three practical points of value are contributed to the literature of T. N. T. poisoning by C. Voegtlin, C. W. Hooper and J. M. Johnson.[8] They recommend that workers in T. N. T. use a skin varnish devised by George F. White. This varnish is composed of 6 parts orange shellac, 1 part castor oil and 24 parts 95 per cent. alcohol. The shellac is dissolved in the alcohol and then the castor oil is added. The mixture is kept in well-stoppered bottles to prevent the evaporation of the alcohol. The varnish is painted on the skin of the hands, forearms and perhaps also the face and neck.

If the worker prefers not to varnish his skin he can use shellacked gloves. Mix 2 parts shellac and 8 parts alcohol and add 1 part castor oil. Treat ordinary cotton gloves with this mixture.

The skin varnish is flexible, does not crack, is impervious to moisture and prevents the absorption of T. N. T. It can be removed with alcohol. The treated gloves are fairly flexible, are fairly durable, do not crack or break and are impervious to moisture.

To wash T. N. T. from the skin the best solvent is 10 per cent. sodium hydrosulphite. A 10 per cent. solution of sodium sulphite is almost as good and is more easily obtained.

All of these practical suggestion are based upon the thought that the principle source of absorption of T. N. T. is the skin. This appears to have been demonstrated with reasonable certainty. However, some absorption does occur through the lungs and no munitions plant should neglect to remove promptly all T. N. T. and other strongly impregnated fumes. The report on the greater importance of the skin as the channel of absorption is in accordance with the final report of the British Commission.

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(8) Pub. Health Reports, June 13, 1919.

Another finding of importance is that meat is as important as milk in conferring protection against T. N. T. poisoning. It is recommended that T. N. T. workers eat from 150 to 200 grams of meat a day as well as other nourishing foods.

All prospective T. N. T. workers should have a preliminary physical examination. Drinkers should be excluded. All persons with high susceptibility should be excluded at once or soon after going to work. High susceptibility is tied up with capacity of the skin to absorb.

The best test of mild T. N. T. poisoning is reduction in the hemoglobin percentage. All workers in T. N. T. plants should have a hemoglobin test on going to work and bi-weekly after that. A drop of 15 per cent. in hemoglobin is enough to cause exclusion.

The urine should be examined for bile pigments biweekly.

Anemic persons should not be allowed to start working in T. N. T. factories. From time to time the workers should be looked over for cyanosis and slight incoördinations.

The urine of animals gives a positive Webster test within two or three hours following the administration of T. N. T. The urine becomes red but the red color is lost on the addition of acid. This red color is characteristic of the urine in the early stages of T. N. T. poisoning but it is not present in the later stages. The feces never give the Webster reaction but the bile from the gall-bladder frequently does.

Dusty Trades. C. E. A. Winslow, L. Greenburg and D. Greenburg[9] say that exposure to mineral and metallic dusts as among brass workers, marble and stone cutters and polishers is accompanied by tuberculosis at least one-third greater than the ratio for all occupied males. They give a comparison of the tuberculosis rates for different age periods of men in nineteen trades reported by the Census Office and by Dr. Hoffman of the Prudential Life Insurance Company.

In one abrasive factory the amount of dust in 100

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(9) Pub. Health Reports, May 30, 1919.

cubic feet of air ranged from 11 milligrams to 623 milligrams. In each of fifteen locations the amount was over 100 milligrams. In nineteen it was less. The figures were worse than those reported by Lanza for the Joplin mines.

In a second abrasive factory conditions were bad but the amount of dust in the air was considerably less than in the first.

Dust in Air. The relative effectiveness of different methods of estimating the dust in the air was compared by H. F. Smyth.[1] He concludes that no single method is ideal but that different methods are adapted to different conditions. Weight determinations alone do not give sufficient information. All in all, he thinks the Palmer apparatus the best. The sugar filter method of Muir and Johnson is also good. Other tests of value are colormetric tests with cloth screens. The Hill capsules and pump, the Duckering cotton filter method and the Whipple precipitation method.

Effect of Inhalation of Dust. In a very interesting and valuable study of dusts, A. Marrogordato[2] finds that the all important question in the harm done by inhalation of dust is the rapidity of elimination rather than the amount of dust, its dosage or perhaps even its other qualities. Dusts that make mischief are those that accumulate. Those that are eliminated are the dusts which produce marked mitral reaction with much shedding of epithelium. Those which accumulate are those which do not produce much initial reaction and shedding of epithelium. Those dusts which produce intial reaction carry out with them the more inert dusts.

H. R. M. Landis[3] approaches the subject of dust inhalation from the clinical side, making use of the *x*-ray very largely for purposes of diagnosis. The *x*-ray picture of lungs that have been exposed to dust is quite characteristic.

Industrial Poisoning. Alice Hamilton[4] says that the

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(1) Jour. Indust. Hygiene, July, 1919.
(2) Jour. Hygiene, October, 1918.
(3) Jour. Indust. Hygiene, July, 1919.
(4) Jour. Indust. Hygiene, June, 1919.

symptoms of brass poisoning are chills, and muscular cramps. The cause is inhalation of the fumes, at least that is the more important cause. Brass poisoning so-called may be due to zinc, copper or lead. The more frequent toxic agent is fumes of zinc oxide, though the chemical is harmless itself.

Aresenic is a frequent source of poisoning among workers in plants where it is produced or driven off from compounds. Arsenic is used in the manufacture of a wide range of commodities. Type contains from 3 to 16 per cent of antimony. Printers are liable to suffer from antimony poisoning as well as lead poisoning.

A good many persons suffer from mercury poisoning not only among miners but among workers in various industries where mercury is used. Among the symptoms are: neuritis, ataxic gait, palsies, hemorrhages and psychosis.

Cases of carbon disulphide poisoning develop psychosis after short exposures, while paralysis is slower in appearing.

Perhaps we shall not hear much more about phosphorus poisoning.

Carbon monoxide poisoning is much more prevalent than we think. It produces unconsciousness and a train of symptoms which go by the name ‘‘gassed.’’ In chronic monoxide poisoning there is polycythema and loss of muscle strength.

Hernia. C. A. Lauffer[5] says that hernia is the greatest single frailty of the American worker; 3 per cent. of the men offering themselves in the industries have hernia and 14 per cent. have incipient hernias. The hernial sac is either congenital or is slowly acquired. A hernial sac may not be occupied or it may be intermittingly occupied. A hernial sac may be present but not palpable. Straining may cause an existing sac to fill for the first time, but it can not cause a sac to be suddenly formed.

Accident Prevention. Education of the employees

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(5) Jour. Indust. Hygiene, August, 1919.

in accident prevention is fundamental in the opinion of the management of the Thomas A. Edison industries based on their experiences. C. W. Banks[6] says that in 1917 they had 4,459 accidents. They then began educational work with their employees and in 1918 the number fell to 2,538—a reduction of 1,921. They have a social service, an industrial hygiene service and the usual work in industrial medicine and surgery. When they began they were enthusiastic about instruction in first-aid work, organizing 150 first-aid centers. These were soon abandoned, since it was found that the "treaters over-treated." He says: "Our troubles were vastly multiplied by an excess of doctoring." There was fully as much work involved in treating iodine burns as in treating the primary wounds. And the excess of bandaging and other treatment was altogether out of proportion to the demands. Now, no bulk iodine is requisitioned and "the first aid application is limited to the iodine treatment from an ampule and one dressing with sterile gauze." Bandaging is discouraged. At the hospital the wound is again iodined and, when dry, neutralized with alcohol. The wound is then covered and all the surrounding area is scrubbed with gasoline. Water and alcohol, equal parts, is the usual wet dressing and the patient is given a small bottle of this to keep the parts wet. Burns are cleaned, antisepticized and dried with a mechanical warm air dryer. They are then covered with the following:

Resorcin	1 per cent.
Oil of eucalyptus	2 per cent.
Olive oil	5 per cent.
Soft paraffin	25 per cent.
Hard paraffin	67 per cent.

This is sprayed on or applied with a spatula. In cases of chemical burns the chemical is first neutralized. Banks says that cases are on record in which men have been killed by 110 volts of electricity.

As to hernia, he agrees with the British Parliamentary Commission that the possibility of inguinal hernia aris-

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(6) Jour. Med. Soc. New Jersey, May, 1919.

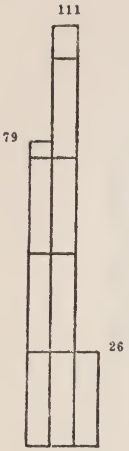

Fig. 57. Accidents due to negligence of fellow employees, 26; unavoidable accidents, 79; accidents due to carelessness, 111.

ing as an accident practically does not exist. Berger in examining ninety-six persons who attributed their hernias to accidents found 230 hernias. In other words, these ninety-six men had more than one hernia each of which they had no knowledge as well as the hernia of which they complained. Only thirty-four men in the series of 130 examined had a single hernia. Preceding the hernia, there is a weak abdominal ring and generally an empty hernial sac. The accident may cause the hernia to come down in more than the usual volume or it may do no more than direct attention to the hernia for the first time.

Analysis of Industrial Accidents. C. Scheffe[1] in analyzing 216 accidents occurring in a large industrial plant produced the accompanying easily understood charts (Figs. 57-60).

Accidents and Their Causes. H. M. Vernon[2] studied and tabulated 50,000 accidents as to their cause. The study was one of the employees of munitions factories. The accidents to men were at a minimum during the first hour of work and increased each hour of work. This was not a result of fatigue, for the number of accidents an hour was no greater in a 12-hour day than in one of 10 hours. When women were studied their accident rate indicated clearly that a 12-hour day was too long. Their fainting rate and sal-volatile administration rate were nine times and twenty-three times as great as that of the men on the 12-hour day; whereas these rates were only three times the men's rates under the 10-hour day.

Speed of production and carelessness were prominent factors in producing accidents.

Temperature was a prominent factor. Accidents were

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(1) Med. Record, April 26, 1919.
(2) Lancet, April 5, 1919.

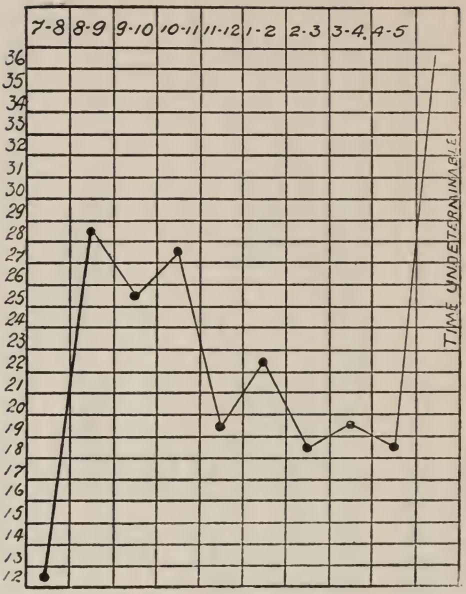

Fig. 58. Time of day during which accidents occurred. Those injuries whose time of occurrence cannot be determined are mostly cases of sepsis.

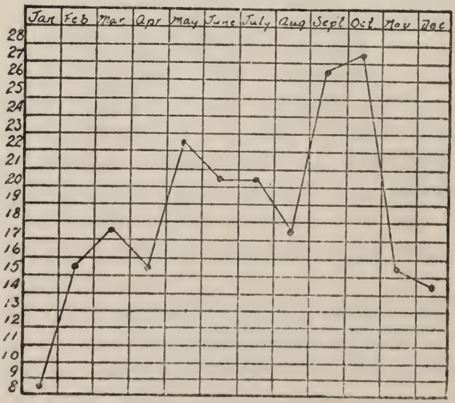

Fig. 59. Frequency of accidents by months.

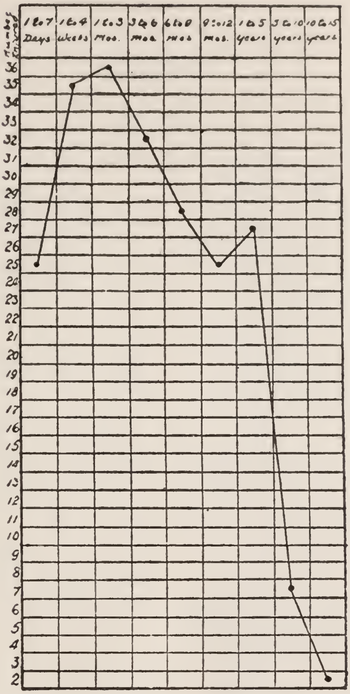

Fig. 60. Length of time which those injured had been employed.

at a minimum at 60°-69° F.; at 72° F. they were 20 per cent. more numerous than at 67° F.; at 77° F. 30 per cent. more numerous; at 57° F. they were 18 per cent. more numerous; at 48° F., the accidents to women increased two and a half times. Night illumination particularly increased the eye accidents. In the worst lighted factory accidents were from 30 to 60 per cent. more numerous than in well-lighted factories. Night work in well-lighted factories showed very little excess. In some places education in safety methods has reduced accidents from 78 to 88 per cent.

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